THE MODEL ENGINEER

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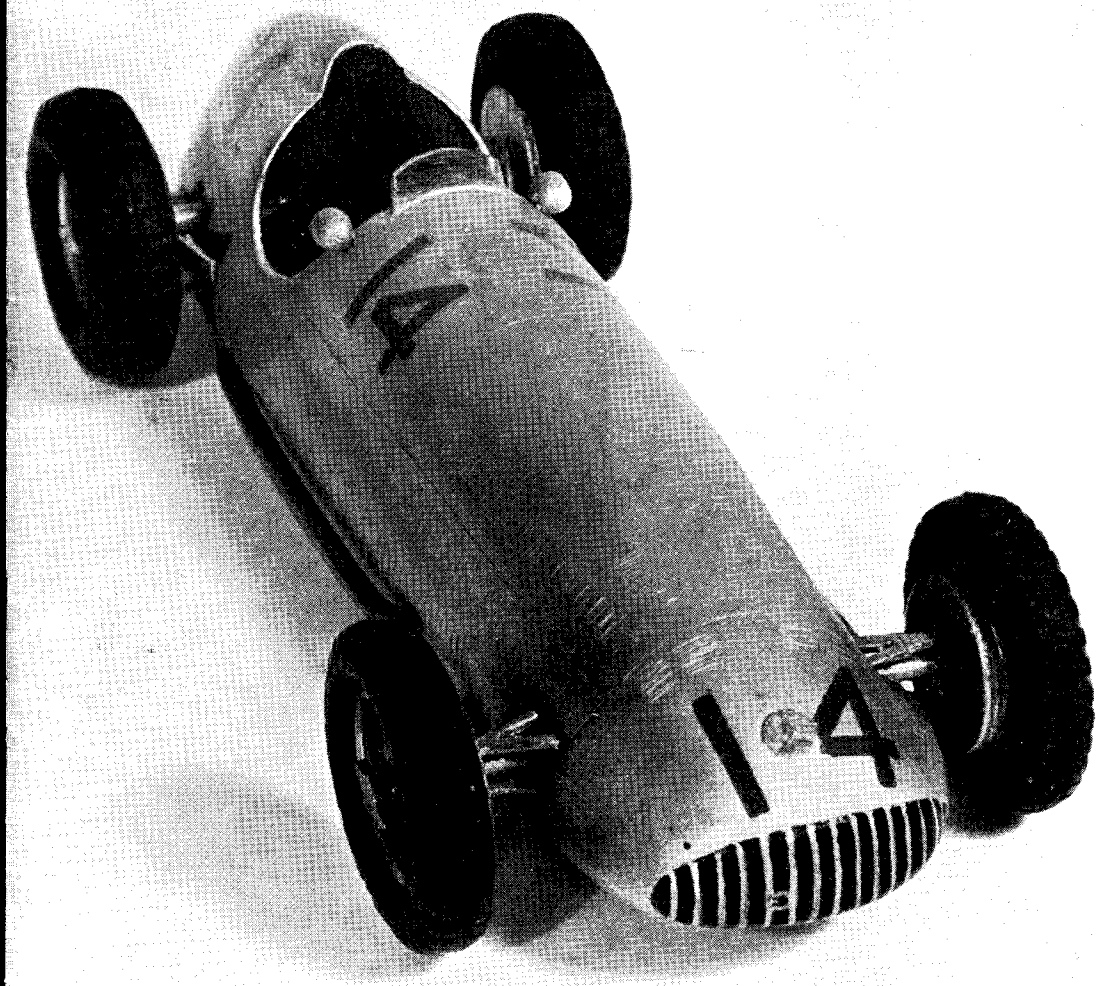


The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

19TH APRIL 1951 VOL. 104 NO. 2604

SMOKE RINGS

Our Cover Picture

● THE SUBJECT for this week's photograph, enlarged so that it appears approximately *twice full size*, is an intriguing little 1/24 in. scale " solid " model of the 1939 three-litre Mercedes Benz, by that stalwart of miniature construction, Mr. C. Posthumus. Model engineers who have read Mr. Posthumus's excellent book, *Miniature Car Construction* (Percival Marshall, 7s. 6d. net), will recognise the similarity of this model to the one on the cover of that book. The text fully describes the development and construction of this and many other types, all of which make excellent show-pieces and could form the nucleus of a really comprehensive collection. This is true model engineering in miniature, and we commend it to all motor racing enthusiasts and others who, through lack of space or funds, are unable to participate in the more advanced stages of metal work. The model is 5⅛ in. long, with 3¼ in. wheelbase, 1⅛ in. rear track, and 1¾ in. front track. Details include fully equipped cockpit with seat and squab cushions, steering wheel and instrument panel, rear-view mirrors and windscreen. Front suspension is all complete, by wishbones, and correct de Dion rear suspension, spoked wheels with " knock-on " hubcaps, and twin outside exhausts ensure a very creditable degree of realism.

It's That " M.E." Again !

● WE HAVE received a cheery letter from a Canadian reader who tells us that he has troubles. That is not very surprising in these days ; the troubles, however, are, as he puts it, " very small, to be sure, but only something that you can cure." That *did* surprise us, but since we are ever ready to do anything we can to help, we read on.

First, we learnt that our friend had purchased a well-known British brand of small milling machine. A question as to the amount of duty which the Canadian authorities would demand entailed a letter to the Deputy Minister of Internal Revenue, and our friend adds : " I sent him a copy of THE MODEL ENGINEER, so that he could see that the tool I wanted was for personal uses only, and I asked him to please return my little book, as I was keeping a library of them."

We regret to say that the " little book " was not returned, the august Internal Revenue officer stating that he was retaining it for his files. Our friend comments : " I'll bet he just wants it for himself." Fortunately, we have been able to send out a duplicate copy, and we hope that *that* little incident has terminated happily. But that isn't all ; there is another tale to be told.

In a postscript to his letter, our friend writes :

"I could tell you quite a story about what THE MODEL ENGINEER has done for me since I started it again. In short, it got my wife homesick to see England, since she left it when she was two, and, as she said, England needs the dollars urgently now. So she sails for England on May 10th, aboard the *Franconia* from Quebec. Now that's what your little book has done. Cheerio!"

From our point of view, we are very sorry to have caused such a domestic upheaval; but on the other hand, we delight in our Canadian friend's apparently unquenchable cheerfulness and warm-hearted feelings towards us.

The Model Railway Exhibition

● THE 1951 Model Railway Exhibition seemed to us to be the best for some years; there was little, if any, falling-off in the number of exhibits, but the general quality of the workmanship was decidedly superior to that displayed in 1949 and 1950. A very noticeable feature was the obvious growth of interest in the pre-grouping era of railways, shown by the extraordinary number of models of locomotives and trains of about the 1895-1914 period. Model railway enthusiasts, the majority of whom are not old enough to remember the prototypes, are clearly discovering something of the fascination of Britain's railways of 50 years ago, and at the same time, are making very creditable efforts to reproduce the characteristics of those times in miniature. For here is an almost limitless field for exploration, the charm of which can never be forgotten by those who are old enough to remember it, and can scarcely fail to captivate younger people who recapture it by building miniature replicas of the rolling-stock and other equipment.

The exhibition, as a whole, was arranged much as usual, each exhibit being well displayed, no matter whether it was a locomotive or coach in the extremely small 2-mm. scale, or an entire model railway in 4-mm., 7-mm., or 10-mm. scale.

The popularity of the show is as great as ever, judging by the crowds we found there; we hope they were as impressed as we were by all that was to be seen.

A "Traction Engine" Exhibition

● A LETTER from Mr. A. T. Phoenix, hon. secretary of the Steam Traction Engine Preservation Association, informs us of a very unusual, but highly desirable, exhibition which has been planned to take place at Thetford, Norfolk, from June 4th till the 9th of this year. The exhibits will include models and traction engines, but further offers and entries of any description are invited. The exhibition is intended to commemorate the achievements of all steam road engines and Charles Burrell & Sons, of Thetford, in particular. It is hoped, also, to include a well-known 1900 veteran car.

We feel that the association deserves all the support it can obtain, not only in connection with this particular exhibition, but chiefly in furthering the objects for which the association was founded; these are, chiefly, to acquire, renovate, preserve, operate and exhibit steam traction and model engines and other historic machines, so as to prevent the total extinction of these things which have rendered such valuable service to the community.

To help to augment the funds which are necessary to enable this work to be carried on, it is proposed to conduct a "draw" for a Burrell "Devonshire" single-crank compound traction engine; a contribution of 10s. 6d. will entitle anyone to participate, if he so desires.

Further particulars of the objectives of the S.T.E.P. Association will be gladly furnished by the hon. secretary, Mr. A. T. Phoenix, 15-17, The Square, Pike Lane, Thetford, Norfolk. Telephone: Thetford 2114.

Novel Records

● MR. J. I. AUSTEN-WALTON informs us that he proposes to issue tape recordings of talks on locomotives. They are to be in lecture form and of about half-an-hour's duration; they would be offered on loan to societies anywhere in the British Isles, at a nominal charge, to cover wear and tear, postage, etc., and, of course, would have to be returned after use.

This idea should be a practicable addition to those tape-recording playback sets which seem to be becoming popular, and we would be interested to know what readers think of it.

Drummond Miniature Locomotives

● OUR NOTE on the Canvey Island locomotive, in THE MODEL ENGINEER for March 29th, has caused some readers to enquire about the obvious discrepancy between the information we gave and that given by Mr. A. E. Tyler's letter in the same issue.

We believe the brief "history" which we quoted is correct; moreover, Mr. W. Tucker, of Bramhall, referred us to *Engineering* for September 11th, 1896, in which the working drawings for these interesting little engines were published together with a detailed description. The drawings show that, except for the fact that the safety-valves appear to have been modified at some time or other, the engine on Canvey Island is precisely the same. The gauge is 2 ft., as we stated, and it is interesting to note that the extreme height from rail level to the top of the chimney is only 5 ft. An engine of this type reduced to 5/24 scale for 5-in. gauge would make an entertaining departure from the more usual kind of miniature steam locomotive, and we are looking into the possibility of producing a suitable design.

It does not seem to be generally known that Dugald Drummond, at one time, had an engineering business in Govan, under the style of D. Drummond & Son, and the five engines referred to were designed there.

Sales Manager, E. R. Howard Ltd.

● MESSRS. E. R. HOWARD LTD., producers of Autobrite and "3-in-One" oil, announce the appointment of Mr. L. A. (Pat) Byrne as field sales manager for the British Isles. Mr. Byrne's selling achievements and organising ability as London representative for the company make him well suited for his new appointment which he takes up immediately.

"That Wonderful Year....."

by "The Dominie"

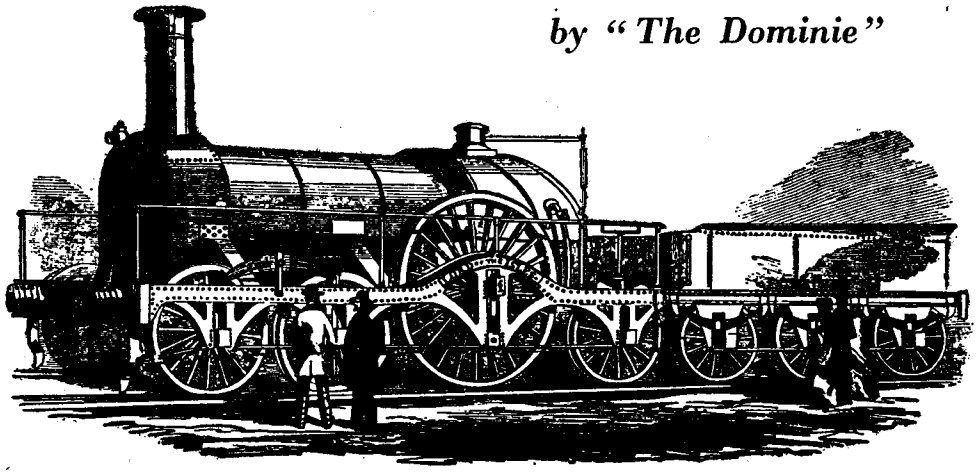


Fig. 1. "Lord of the Isles," the renowned Great Western locomotive at the 1851 Exhibition. This contemporary engraving rather exaggerates the size—cf height of man with 8-ft. driving wheel

FROM H. G. Wells down to writers in modern "science-fiction" magazines, the idea of travelling in Time has presented an absorbing theme for stories of more or less entertainment value. How fascinating it would be to the average model engineer if in some magical way he could be transported into the past, and what treasures would await him there! To see the *Rocket* at Rainhill, or the launching of the *Great Eastern*; to travel on Hancock's steam omnibus, or to hear the beat of Trevithick's first high-pressure steam engine—what treasures indeed.

But in this year of the Festival of Britain, our hero's mind would revert probably to that other great occasion, the "wonderful year" of 1851, when the building which became known as the Crystal Palace arose in Hyde Park to become the home of "The Great Exhibition of All the Nations." And if he set the controls of his time-machine to take him back to May, 1851, he would be well rewarded indeed.

Perhaps he would wend his way first to that part of the building containing Class 5—"Machines for Direct Use, including Carriages, Railway and Marine Mechanisms." Shall we join him as he espies the railway locomotives, with the

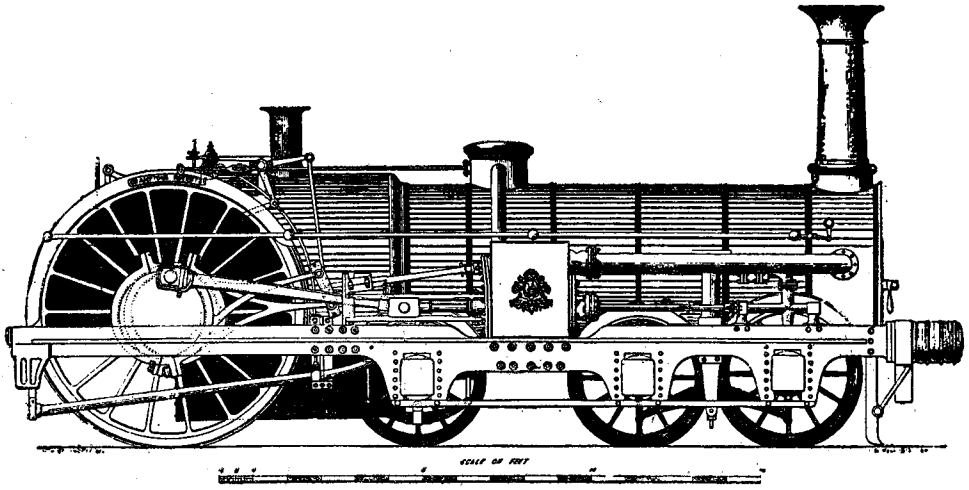


Fig. 2. The L.N.W.R. locomotive, "Liverpool," whose layout was very interesting. Note pump on footboard, driven from extension of piston-rod

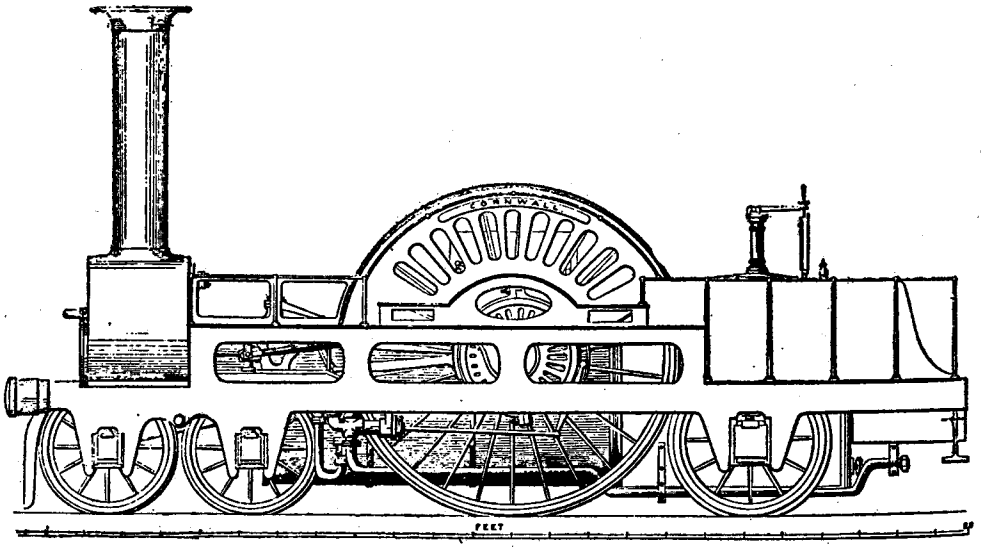


Fig. 3. The L.N.W.R. locomotive, "Cornwall," with 8 ft. 6 in. drivers and "underslung" boiler

"stupendous wide-gauge engine *Lord of the Isles*" in pride of place? The contemporary engraving herewith does less than justice to the beauty of this engine, which was one of a class constructed by the Great Western Company since 1847. Designed by Gooch, the class was to reign practically unchallenged on the broad gauge until its passing in 1892, and this particular example was to run more than three-quarters of a million miles with her original boiler. She was also to appear at exhibitions in Edinburgh in 1890, in Chicago in 1893, and Earls Court in 1897.

The driving wheels were 8 ft. in diameter, and the two cylinders were 18 in. × 24 in. Heating surface of the 305 tubes was 1,795 sq. ft., and of the firebox 156 sq. ft., the working pressure being 120 lb. p.s.i. (later raised to 140 lb. p.s.i.). Tested by dynamometer, the effective horse-power was 743, and the engine was designed to take a passenger train of 120 tons at an average speed of 60 m.p.h. on ordinary gradients.

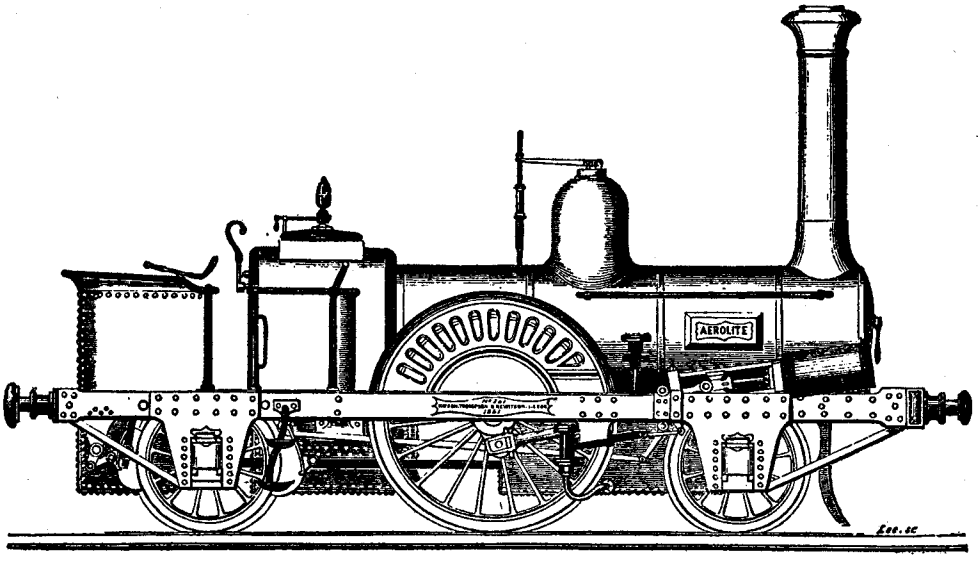


Fig. 4. Kitson's "Aerolite" as originally built and shown at the Crystal Palace

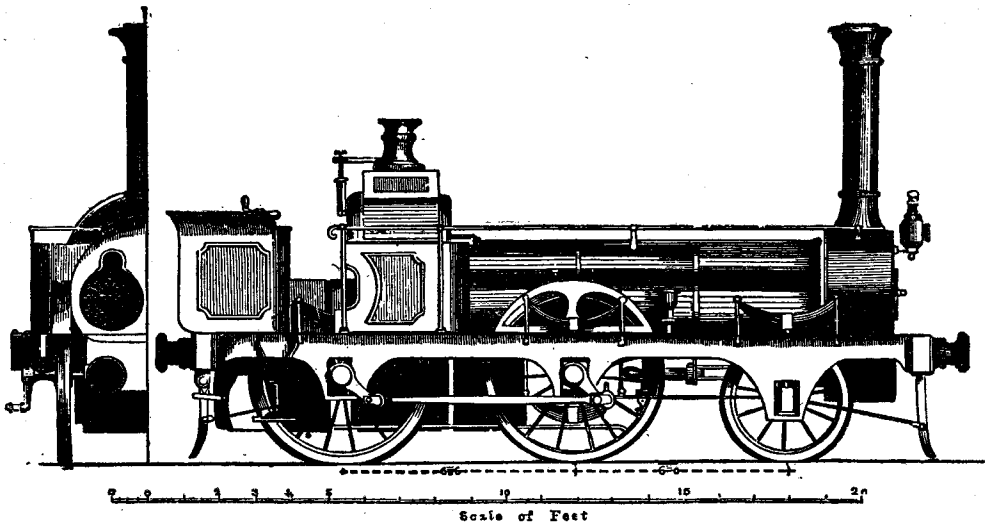


Fig. 5. Wilson & Co.'s tank engine, with two boilers side by side

In working order the engine weighed 35 tons, and the tender 17 tons 13 cwt., including 1½ tons of coke and 7 tons 3 cwt. (1,600 gals.) of water.

A magazine of the period states "The stately proportions of this engine are seen to great advantage in the Crystal Palace . . . To see this engine in its full glory, however, the spectator should be at its side when it stops, after a heavy run at express speed—when the furnace is too white with heat for the naked eye to look upon without pain, and the steam, blowing off like thunder, shakes the very ground." Doesn't this account make one wonder what the people of the year 2051 will think of the achievements of our century, of which *we* are so proud?

Close to the Great Western engine, our adventurer would see the exhibits of the London & North Western, including the engine *Liverpool* (Fig. 2), built to "Crampton's Patent." This engine must have been very fascinating to watch in action, with the great eccentrics of her Stephenson link motion tumbling and bobbing outside her flashing 8-ft. drivers. At this time, *Liverpool* was claimed to be the most powerful engine in the world, being "equal to 1,140 horse-power." The bore, stroke, and working pressure were equal to her broad-gauge rival, but the heating surface was greater at 2,290 sq. ft., and the weight less at 32 tons.

Also on the L.N.W. stand was the world-

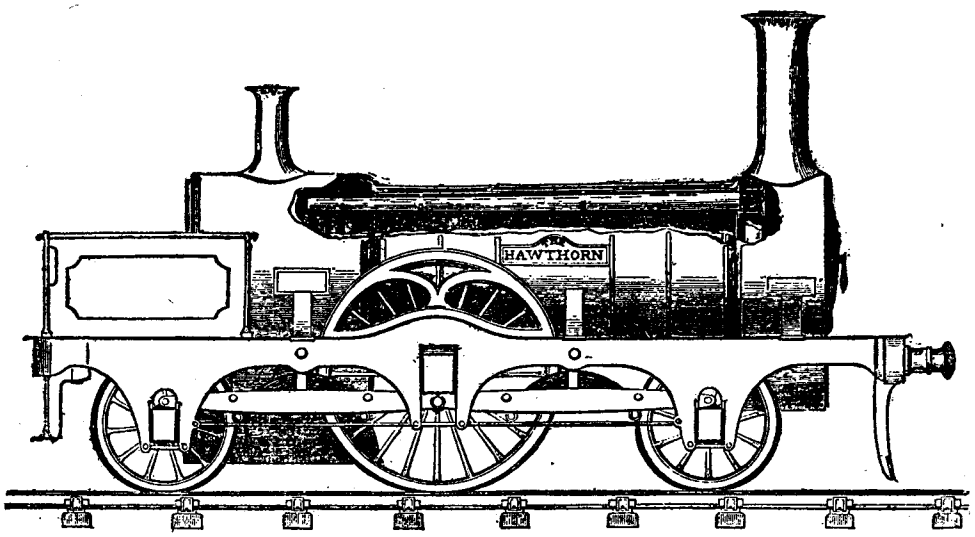


Fig. 6. "Hawthorn," the locomotive with unusual features for the period. Note among these the steam collecting pipe, and the compensating levers for the springing system

famous *Cornwall* (Fig. 3), designed by the line's locomotive superintendent, Mr. Trevithick, and built at Crewe in 1847. The boiler was placed very low, and the axle of the 8 ft. 6 in. driving wheels actually passed through it. Again, two enormous eccentrics outside the wheels drove Stephenson valve-gear. The cylinders were 17½ in. by 24 in., and the weight was 27 tons. Incidentally, subsequent rebuilds altered this locomotive beyond recognition.

Two well-known Leeds firms were each represented by "specimens of the combined engine and tender variety or 'tank engines' as they are technically termed." Kitson, Thompson & Hewitson exhibited *Aerolite* which, with various rebuilds, was to last many decades.

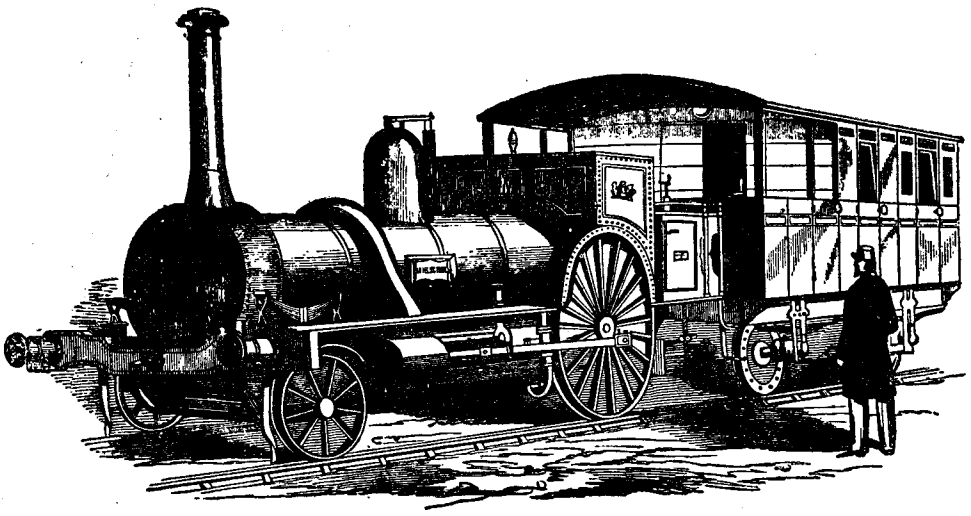


Fig. 7. "Ariel's Girdle," designed to solve the problem of light traffic which did not justify running a heavier locomotive

The driving wheels of this handsome engine were 6 ft. in diameter, the other four being 3 ft. 8 in. The cylinders were 11 in. bore with a stroke of 22 in.; the boiler contained 105 tubes of 1⅞ in. diameter, with a heating surface of 536 sq. ft., plus 62 sq. ft. for the firebox. The two tanks—one under the boiler and one under the coke space—carried 500 gals. of water, and the half-ton of coke was sufficient for 50 miles when running light express trains.

The chief, and unusual, feature of E. B. Wilson & Co.'s tank engine (Fig. 5) was that there were two boilers and two fireboxes side-by-side! The boilers were each 10 ft. in length and 1 ft. 9 in. in diameter, the fireboxes being 2 ft. 2 in. long by 1 ft. 9 in. wide and 4 ft. 9 in. high. It is not clear what advantages were intended to accrue from this singular arrangement, except the claim that "stoking can be performed at alternate intervals in each box."

Further down the aisle we see another locomotive, *The Hawthorn*, with some features which are unusual to the practice of the day. As will be seen in Fig. 6, the springs are between the wheels, and compensating levers between the axleboxes communicate simultaneous action to them, giving great stability and easy motion to the engine. "The patent steampipe is likewise introduced, which does away with all domes or cumbrous projections on top of the boiler." And yet another patent of the builders, R. & W. Hawthorn, was that the expansion link of the valve-gear was directly connected by an eye-joint to the valve-rod, removing its weight from the reversing gear and requiring less power to reverse or to alter the cut-off. It was also claimed that the action of the valves was more correct.

The slide-valves were contained in a common valve-chest between the two inside cylinders, which were 16 in. by 22 in. The boiler contained 158 brass tubes 2 in. in diameter, giving 865.4 sq. ft., with an additional 40 sq. ft. from the firebox, which contained a "bridge" to give additional water-space.

Close to *Hawthorn* stands what must be one of the first attempts to solve the problem of light branch-line passenger traffic—the fore-runner of rail-cars. This is *Ariel's Girdle* (Fig. 7), an attractive little 2-2-0 locomotive direct-coupled to a four-wheeled carriage. With cylinders of 9 in. bore and 15 in. stroke, the drivers were 5 ft. diameter. Water was carried in one tank under the footplate and another under the floor of the passenger car, totalling 837 gals., while a receptacle over the firebox held 6 cwt. of coke. This engine subsequently was tried very successfully on the Eastern Counties Railway; its sponsor at the exhibition was the patentee, W. Bridges Adams, and the engine had been built by Kitson's, of Leeds, with carriage by Brown & Marshall, of Birmingham.

But much as we should like, we cannot spend all day looking at the railway engines, for there is so much to see in this magnificent show. Yet as we squeeze through the great crowds, on our way to see the portable and other steam engines,

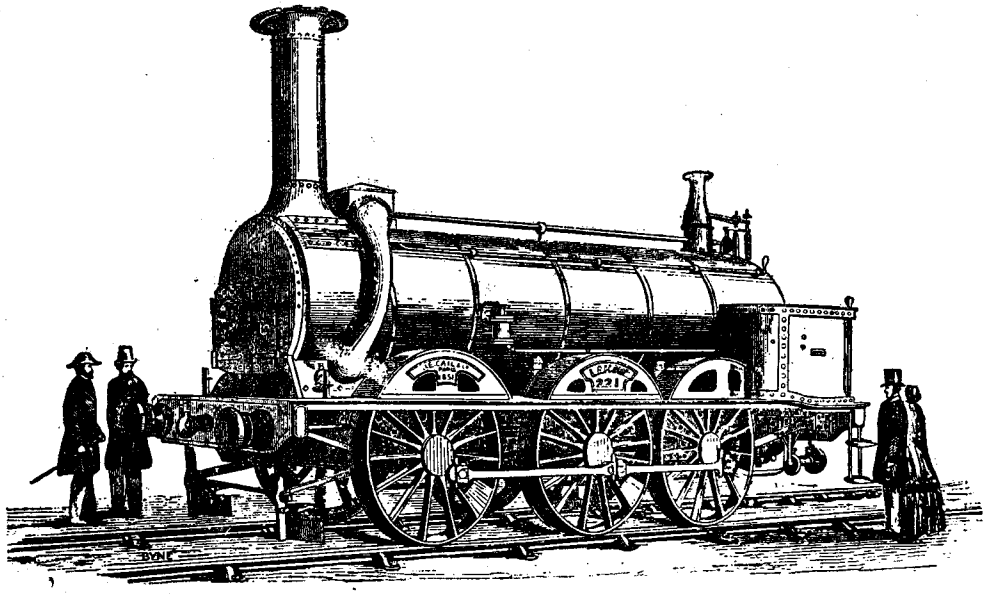


Fig. 8. *" Lahore," the six-coupled French locomotive which was much admired in* 1851. *Here again the engraving exaggerates the size*

we see an impressive-looking chimney over their heads, and stay a few moments to admire the French six-coupled locomotive, by Messrs. Cail & Co., of Paris. (Fig. 8.)

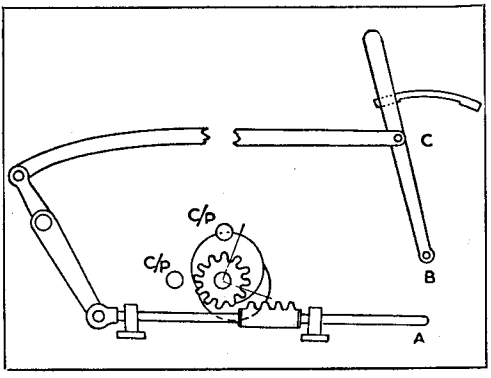
Then off we go again—I say, these crinolines on the ladies are an awful nuisance in the crowd, aren't they? Still, let's hope that the people round the agricultural exhibits will be mostly men!

(To be continued)

Slip Eccentric Gears

by C. Claxton

JUDGING by certain contributors who from time to time advocate the use of this type of gear, it does not appear to be known that it can be made to operate by a lever in the cab, in the same way as any other type of gear. Here I wish to state that I am not the author of this idea, but I saw it some years ago in, I believe, a mechanical journal, the name of which, however, I cannot recall. All that is required is a small gear wheel and a short piece of rack, with a sufficient number of teeth to move and reverse the eccentrics and clear past the gear wheel. This gear wheel must be placed between the sheaves, set at 90 deg. to each other. Put a plain collar at one end and a stop collar the other end, and fasten the whole assembly together making it a running fit on the axle.

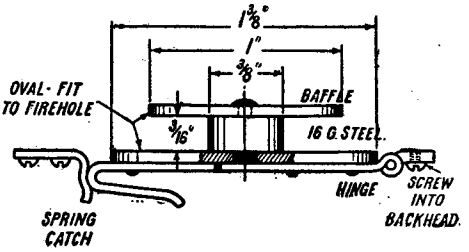


The stop pin, only one of which will be required, should be placed close to the axlebox. Two guides must be fitted to hold the rack in position and allow for its free movement. To prevent gear lever making any unauthorised movement while the engine is in motion, a notch should be filed in the lever gate, as shown. My rough drawing, which will perhaps make the idea clearer, shows the position in back gear. My own idea would be to extend the rack-rod under the firebox and cab, and connect point *A* to point *B* of the lever, using point *C* as the fulcrum pin for said lever to work on, thus doing away with weigh-bar shaft and reach-rod. Anyway, I leave it to those who are interested to work out the best way of fitting it up, and trust the explanation I have given will be helpful.

"L.B.S.C.'s" Beginners' Corner

Grate and Ashpan for "Tich"

WHEN the outline drawing of *Tich* first appeared, and it was mentioned that an eccentric for driving the pump would be mounted on the driving axle, I received the usual crop of letters from the good folk who are never happy unless they are finding fault with something or other. In this case, the awful moan was that, being right under the firebox, the eccentric would be smothered with ash and grit, and wouldn't last the proverbial five minutes. That didn't worry your humble servant in the slightest,



Plan of firehole door

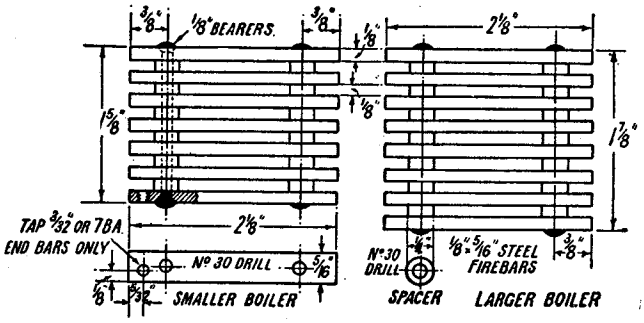
as I have built enough locomotives during my lifetime, to know what I am about ; in fact, I believe I've built more than the sum total of all the critics, some of whose achievements in that line are precisely and exactly nil. Anyway, it was my original intention to dispense with the usual type of ashpan ; and in lieu, use a shield over the trailing hornblocks, axleboxes and eccentric, in a manner somewhat similar to the successful scheme I employed on the gauge " O " *Sir Morris de Cowley*, which is now 25 years old and still going well, although she hasn't grown much ! However, when I came to build my own *Tich*, I found that there was enough room for a simple grate and ashpan of the usual type ; and as it was an easier job than fitting the shield, and the grate could be made to dump and reset without turning the engine upside down, here is the whole doings, for beginners to follow suit.

The ashpan is of the ordinary box type, open at the back only, but it has a sloping bottom, which not only allows the eccentric plenty of clearance (see dotted line in the erection drawing, which shows the eccentric in its highest position) but renders it self-cleaning, any residue falling out clear of the eccentric and axleboxes. The " moaners " will probably say that when running bunker first, the eccentric might catch some grit ; but how often will she run bunker first ? She is intended for passenger-hauling, and if you put her bunker first at the leading end of your flat car, how are you going to drive and fire ? Well, let's get to business.

Firehole Door

First we need a firehole door ; this may be a casting with the hinges and straps already on it, or it may be built up from sheet metal, as shown in the illustration. A casting will have the boss on it, for attachment of the baffle plate. Chuck in four-jaw with the boss outwards, set same to run truly, then turn down about ⅛ in. of it to ⅛ in. diameter. Cut out a piece of 16-gauge steel to an oval shape, approximately 9/16 in. × 1 in., drill a No. 30 hole in the middle, and put it on the pip, riveting over the end. The hinges being cast on, it is only necessary to drill the lugs with 1/16-in. drill. Rivet on a handle, as described below, and drill three 3/32-in. air holes in the door, as shown in the illustrations of the complete backhead

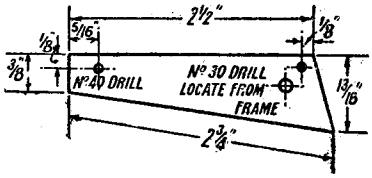
The built-up door is an oval of 16-gauge steel, measuring 1⅜ in. × ⅞ in. approximately, the baffle being the same as above ; the distance-piece is turned from ⅜-in. rod, with a pip on each end, the door and baffle being attached to it as shown in the illustration. The hinges are made from ⅛-in. strips of 18- or 20-gauge metal, in a similar way to those on the smokebox door, and riveted on with bits of domestic pins ; the handle is a similar piece of strip, bent as shown in the plan. The hinge lug, shown in the back-head illustrations, can be filed from an odd bit of brass of suitable size, or made from 20-gauge



Details of the grates

sheet metal, the piece fitting between the ends of the straps being bent into a loop, same as the strap ends shown in plan. The hinge pin is a piece of 16-gauge wire. The spring catch may either be made from a piece of spring steel, or hard bronze ; I use the same stuff as is used for

dynamo and motor brush springs, which is easily cut and bent with ordinary snips and pliers, yet keeps springy enough to do the job. The shape is shown in the plan. The whole issue is attached to the backhead by 8-B.A. screws, which should be home made from a bit of $\frac{3}{16}$-in. phosphor-bronze rod. It is only a matter of a few minutes' work to make them—I've previously detailed the simple process—and it saves

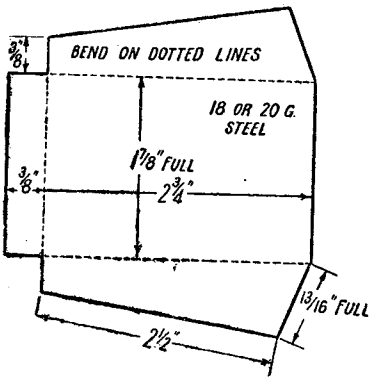


Side of ashpan

the annoyance of having the heads of ordinary commercial " brass " screws rotting and breaking off. Bend the spring catch so that there is just sufficient pressure on the door handle, to prevent the door coming open on its own ; no more is needed. You can then do the same as Curly does when firing on the run, viz. flick the door open with the fireman's shovel, and bang it shut again with the same implement.

Grate

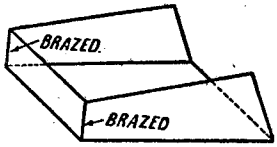
If you can get a cast grate from one of our approved advertisers, I recommend its use, as it saves work, and will last much longer than



Ashpan " in the flat "

one made up with cut steel firebars. Our Scottish friend, " Wilwau," is a nugget at casting grates, and the samples he sent me needed no machining whatever. For a built-up grate for the smaller boiler, seven pieces of $\frac{5}{16}$ in. × $\frac{1}{8}$ in. black strip steel will be needed, each $2\frac{1}{8}$ in. long ; the larger boiler requires one more, as its firebox is a little wider. In one of the pieces drill two No. 30 holes at $\frac{3}{8}$ in. from each end, and use it as a jig or guide to drill all the others ; all the holes must line up, or the bearers won't go through them.

The smaller grate needs twelve spacers ; and the larger one, fourteen. Chuck a piece of $\frac{1}{4}$-in. round mild-steel in three-jaw ; face, centre, drill as deeply as you can with No. 30 drill, part off $\frac{1}{8}$ in. slices until you reach the end of the hole, then ditto repeato until you have the required number of spacers. To assemble the grate, take a piece of soft steel wire (rustless, if you like ; it lasts longer than ordinary steel, only it must be



How the ashpan looks after bending

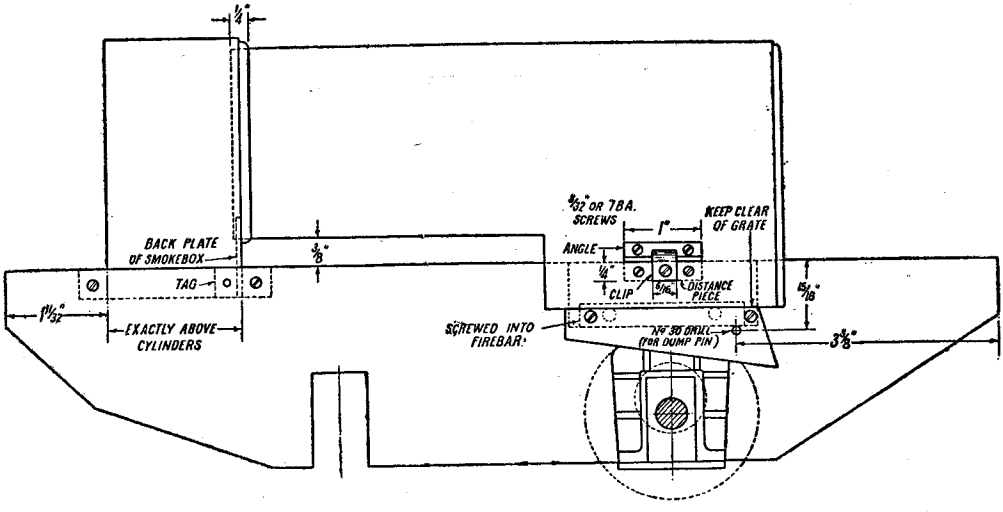
soft ; iron wire would do) and grip it vertically in the bench vice, leaving about 2 in. above the jaws. Countersink the holes on one side of one of the bars, and put this on the wire, with the countersink downwards ; then a spacer, then another bar, repeating operations until you have the required number of bars on ; seven or eight as the case may be. Countersink the holes in the last bar, and put it on with the countersinks upwards. Cut off the wire about $\frac{1}{8}$ in. from the top bar, and carefully rivet over the end, so that it fills the countersink and projects a wee bit, as shown in the illustration. Now remove the assembly from the vice, taking care that the bars don't fall off the other end, otherwise the dictionary of railroad Esperanto might need revision and additions. Turn it the other way up, rest the head you have already made, on something solid—my bench vice has a hammering block cast on it—cut off the other end, same as above, and repeat riveting process. Leave it loose enough to allow the bars to swivel whilst you thread the second bearer through, and put the spacers on ; rivet the second up tightly, then finish tightening the first one, and there is your grate. If the ends look a bit ragged and uneven, a few judicious strokes with a file will smarten them up a bit.

Ashpan

The ashpan is made from 18- or 20-gauge steel. Cut out the piece of sheet to the shape and size shown, and bend on the dotted lines, so that it looks like the perspective sketch. Braze the front corners ; merely stand it end-up in the pan, apply wet flux (Boron compo for preference) blow up to bright red, and touch the joints with a bit of soft brass wire. I use a 100-litre tip in my Alda blowpipe, plus a touch of Sif-bronze, for these jobs. Quench in water, and knock off the burnt flux. Tip : to save scratches on your hands later on, round off slightly all the sharp corners and edges. Young Curly learned that trick the hard way, children's fingers being thin-skinned and soft ! Drill the two holes, shown, near the upper edge of the ashpan, making sure that both sides are in line, or you'll have trouble in fitting ; but leave the one for the dumping pin until the boiler is erected.

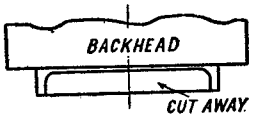
How to Erect Grate and Ashpan

Now watch your step carefully on the next bit. On either a cast or built-up grate, procedure is the same. At 5/32 in. from the front end of each outside firebar, and $\frac{1}{8}$ in. from the underside, drill a No. 48 hole, and tap it 3/32 in. or 7 B.A. bar, with the one just drilled ; then put one of the special screws in. Repeat operations on other side. Both screws should go right home to the end of the thread in the firebars, as shown in the end view and part section. Run the No. 40 drill through the hole at the other end, but only



How to erect the smaller boiler

Now make two screws, from $\frac{3}{16}$-in. rustless steel if you have any ; if not, mild-steel will have to serve. Chuck in three-jaw, and turn down $\frac{3}{8}$ in. length to 3/32 in. diameter ; screw half of it only, with 3/32-in. or 7-B.A. die, leaving $\frac{3}{16}$ in. of plain, between thread and shoulder. Part off at $\frac{1}{8}$ in. from the shoulder, and slot the head with a thin hacksaw blade. Next, cut away most of the projecting bottom of the inside back firebox plate, to allow the maximum amount of room for clearing out the clinkers and other residue when the grate is down. Grate and ashpan can then be erected, and this calls for a little jerrywangling. Put the ashpan over the projecting



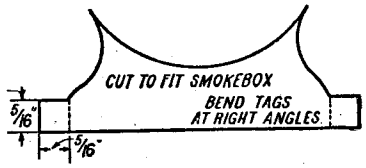
Extra clearance for fire residue

bottom of the firebox ; this is easily done if the boiler is place upside down on the bench, supported on two chocks, or on the partly-opened jaws of the bench vice. Then insert the No. 40 drill through the ditto hole in the front end of the ashpan side, and drill through the firebox plate. Put a bit of 3/32-in. wire, or a screw, temporarily through the two holes, whilst you repeat operations on the other side.

Now comes the little bit of patience testing. Insert the grate, with a pair of long-nosed pliers, and line up the tapped hole in the outside make a countersink on the firebox plate ; follow with No. 48, tap 3/32 in. or 7 B.A., and put a couple of ordinary screws in. The ashpan is now held tightly in place against the underside of the foundation ring ; but the grate pivots on the two special screws and the back end will drop down into the ashpan when the boiler is right way up.

Backplate for Smaller Smokebox

All you need to close in the back of the smaller smokebox, is a piece of 16-gauge steel sheet cut to fit the space, as shown in the illustration. The actual shape of this is ascertained from the



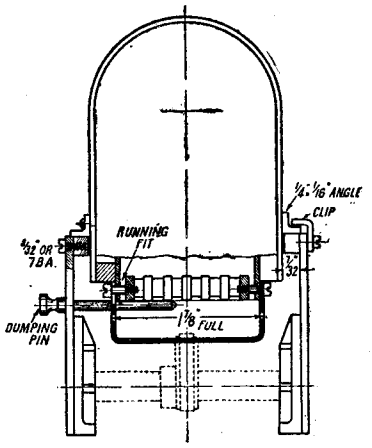
Backplate of smokebox

smokebox itself ; it should be a nice fit, naturally. Leave a small tag at each bottom corner, as shown ; these are bent at right-angles to the plate and riveted to the inside of the wrapper, as shown in the erection drawing. If there is a rivet in the way knock out it, continue the hole through the tag, and put a longer rivet through.

How to Erect the Small Boiler

All plain sailing now ! To keep the firebox amidships, as our nautical friends would put it,

two distance-pieces or spacers are needed, attached to the inside of the frames, level with the top, and just over the driving hornblocks. The exact position doesn't matter. They are 1-in. lengths of ¼-in. square rod, with a full 1/32 in. filed off one facet, as shown in the cross-section, and are attached by two 3/32-in. or 7-B.A. screws put through clearing holes in the frame (No. 40 drill) into tapped holes in the pieces of rod; a simple job requiring no detailing. *Tich* builders should be getting quite expert at jobs like these, at this stage! Put a smear of plumbers' jointing around the opening at the back of the smokebox, and push the boiler barrel in for ¼ in. depth. No further fixing is needed if a fairly tight push fit, as it should be. Look at it endwise, and see that the chimney is vertical when compared with the dome behind it. Then take off the blastpipe cap, and carefully drop the complete assembly into position, firebox between spacers, and the smokebox wrapper between the frames at the front end, the side strips being level with the tops of frames, as shown in the side view of the whole doings. Put a piece of ⅜-in. rod, square for preference, across the frames just in front of the firebox, and let the boiler barrel sit down on it. Adjust boiler lengthwise, until the smokebox is exactly level with cylinders, as shown, and you are literally all set.



How to fix boiler and ashpan

The smokebox end can be attached to the frames by screws at each side, put through clearing holes in the frame into tapped holes in the ends of the strips, as shown in the end view of smokebox in December 14th, 1950, issue; or you can drill clearing holes through the lot, and use 3/32-in. or 7-B.A. bolts, or screws and nuts. The back end has to have expansion joints, as the boiler lengthens when in steam. Cut two 1-in. lengths of ½-in. × ⅛-in. angle, or bend up two bits of sheet brass, thus making your own angle. Drill two No. 40 holes in each, rest them on top of the distance pieces as shown, attach to the boiler with 3/32-in. or 7-B.A. brass screws, and sweat them over, same as the stayheads. Now cut two strips of 16- or 18-gauge sheet brass or copper, and bend one end over to form a clip. Drill a No. 40 hole in each, put the clip over the angle, and attach by a 3/32-in. or 7-B.A. screw running into a tapped hole in the frame and distance-piece, as shown in the end view and part cross-section. Take away the bit of rod from under the barrel, and the boiler should be quite firm on the frames.

The No. 30 hole for the dumping pin is drilled 3¾ in. from back of frame, and 1⅜ in. from the top. Hold the hand brace level, and continue drilling through the side of the ashpan. The pin itself is simply a 1½-in. length of ¼-in. round steel, one end rounded, and the other furnished with a turned knob screwed on. No matter what Inspector Meticulous says about "one-side support," it will do the job, otherwise I shouldn't specify it!

The Steam Locomotive Today

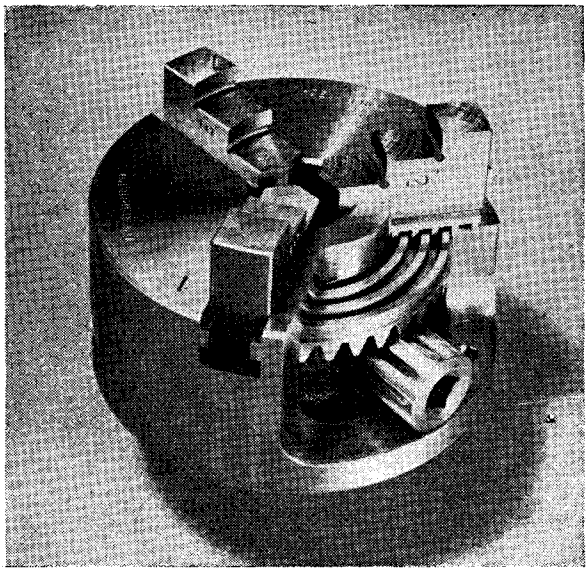
Now that the details of the design of the B.R. standard 4-6-2 locomotives are known, some comments upon the general trend of locomotive design may be of interest. To some people, the new engines are frankly a disappointment; but to many others, they are just about what was expected, because of the simplicity of the general design and the accessibility of the principal working parts.

It is a remarkable fact that any attempt to depart from what may be regarded as the orthodox design for the steam locomotive has usually failed to give, hitherto, results which would justify any radical changes being made. There must have been hundreds of such attempts made in Britain and abroad during the past 100 years, but very few of them have been worth adopting as general practice for any length of time. Epoch-making devices, such as superheaters and long-lap valves, do not come along very frequently, and we may well have to wait a long time for another. Meanwhile, locomotive engineers are giving the utmost attention to making the best of the steam locomotive as it is, by striving to ensure that it shall be at least as economical as modern knowledge can make it, in operation and maintenance.

In his recent presidential address to the Institution of Locomotive Engineers, Mr. R. A. Riddles put forward a novel idea that may have far-reaching effect on future steam locomotive operation; he suggested that cost per drawbar horsepower might ultimately prove to be a potent factor in deciding future developments in railway motive power. On this basis, at present, the modern steam locomotive has a considerable advantage over all its competitors; if its availability can be improved, it can hold its own against all comers, apparently. As if to pin-point this idea, three American railways have lately announced that, as a result of adopting improved methods of maintenance and operation, economies of up to 20 per cent. in fuel consumption and no less than 90 per cent. in availability have been effected in existing steam locomotives. This comes rather late in the day in the U.S.A., but it would appear to be a lesson worth learning.

Chucks — and Chuck Sense

by "Scotia"

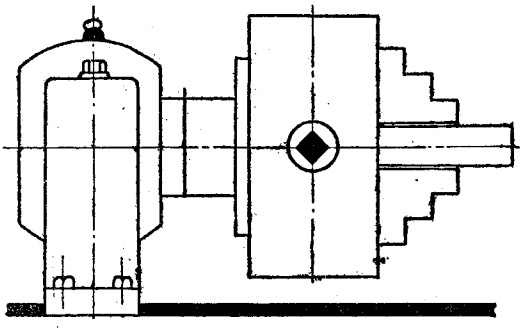


An interesting photograph, showing the sturdy construction of a Burnerd self-centring chuck

THE chucking of work on the lathe quite often represents a big obstacle to the would-be turner, and in all fairness, the skill required in many chucking operations should not be under-estimated. With a little knowledge and experience, however, this need have no terrors for anyone, and it is with the object of helping in this connection that the following notes on the operation and maintenance of three- and four-jaw chucks are written.

If the notes appear to have something of a random quality in their order of appearance, perhaps the writer will be forgiven, as the intention is to give a brief summary of time-saving methods which can be applied in chucking operations in general, and some remarks on the maintenance of them.

Quite often, the remedy to overcome snags, or to save time, is of such simple character, that one wonders at not having thought of it before.



Showing method of "papering" a chuck true

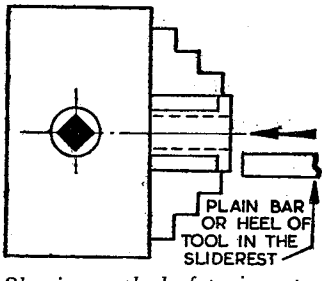
To begin then, let us assume that some discs or washers have to be faced up after parting off, and it is desirable that the faces be relatively true to one another. The following method will be found very satisfactory.

Place the washer or disc in the chuck, holding it rather lightly, giving it little more than half the usual strength of grip.

Now insert a tool in the saddle, wrong way in, making sure that the heel of the tool, which is outermost has no sharp edges to it.

Now start the lathe slow to medium speed, moving the saddle forward to let the heel of the tool come up gently and firmly on the face of the work, when alignment will automatically occur, allowing one to take a finishing cut, after a final tightening of the chuck.

A smear of oil should be applied to the work, prior to trueing up in the manner described.



Showing method of truing up a flanged bush prior to facing up. Contact is made slow to medium speed!

It will be readily understood that this method of speedy and accurate trueing of the work, is of real importance as a time-saver.

Concerning the question of chuck performance, it is exasperating indeed when we find that the material gripped in the self-centring chuck is just a shade short of being dead true. This can be corrected, at least for the occasion, by the

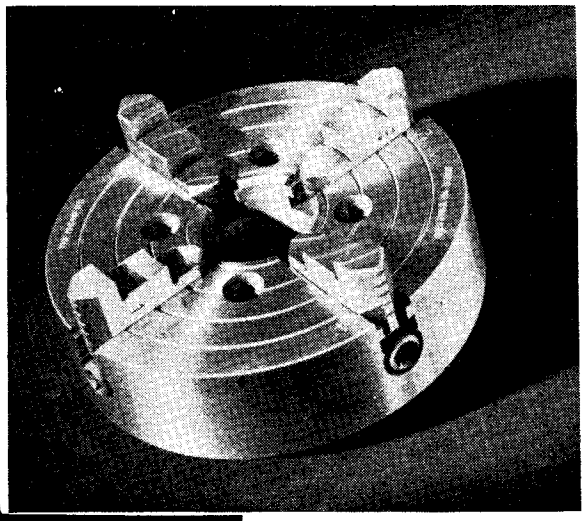
insertion of a scrap of thin paper between the backplate of the chuck and the mandrel face, finding by " trial and error," the correct position for the paper, and whether a single or double thickness is required. It should be borne in mind that this age-old trick should only be resorted to when very little off-truth is present—it is not a good practice to use large thicknesses of paper. Oddly, enough, it is often found that one particular position for tightening the self-centring chuck gives a truer grip than the others, and it is well worth finding this out, and the number noted for future use. It may be remarked, however, that it is possible that a true grip cannot be expected from this position at all diameters, which is possibly due to the scroll of the chuck being worn unevenly, as a result, perhaps of excessive strain being applied, and in consequence showing an inconsistency of truth " up and down the scale."

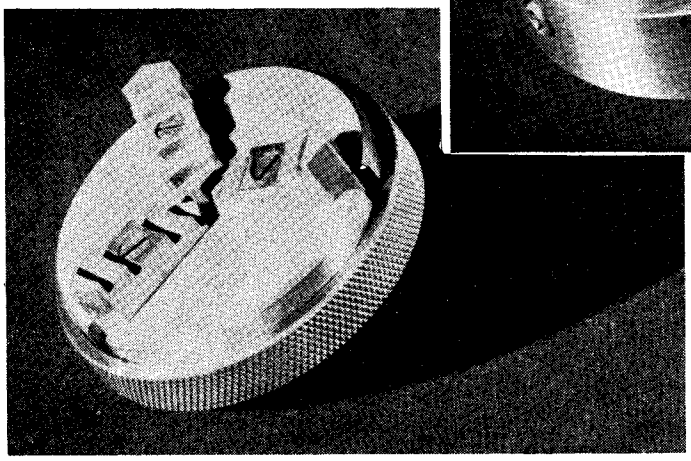
If a number of parts of similar shape have to be gripped in the independent four-jaw chuck, time may be saved by putting a chalk-mark on two of the jaws after the first component is set, the chalked jaws being operated in the subsequent setting of the parts, thus obviating to a great extent, the laborious business of working all four jaws in a haphazard fashion.

Difficulty, too, is sometimes experienced in truing up work in the independent chuck, especially when it is desired to line up to a true register, which is only partly visible, being situated inside the jaws, the latter causing confusion to the eye, by reason of the revolving movement of the chuck. The writer has often found recourse to the use of a light-coloured piece of paper.

With the paper lying on the shears of the lathe, directly under the chuck, the lathe is started and then carefully brought to a stop, the paper serving as a background on which to note the " high-spot " of the work, when it is then possible to slacken and tighten the appropriate jaws. This dodge is very useful, especially when it is not possible to employ a test indicator on the work.

May it be remarked that if one type of chuck were available to the writer, and given his choice in the matter, undoubtedly the independent four-jaw chuck would take first place, covering as it does almost every requirement in chucking capacity, as opposed to the three-jaw self-centring chuck, which is limited to castings and bar-stock which are almost exclusively of round shape or section.





Above—For lathe work in general, the independently operated four-jaw chuck is hard to beat!

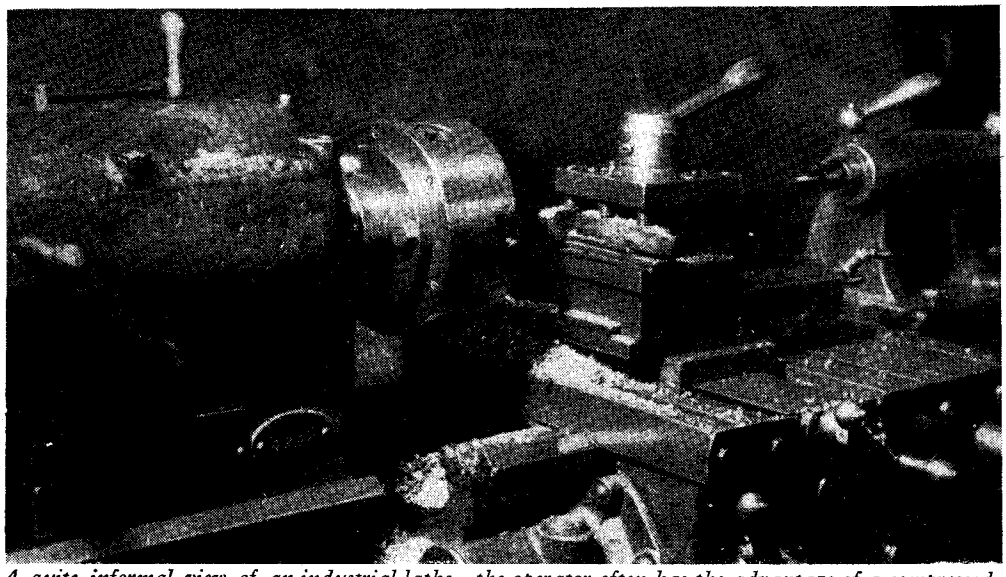
Left—This small precision chuck, fitted with reversible jaws, is only 2½ in. in diameter, and weighs exactly 10 *oz.*

Regarding the care of chucks, it is well worth while to keep them clean and free from swarf and dirt. Not only is the latter harmful to the scroll and teeth of the jaws, but it has a detrimental effect on the chuck in general.

It is often quite impossible for the worker to assess the strength of grip employed on the work, as the movement of the chuck is retarded, to a certain extent, by the amount of grit, etc., in its innards. A good chuck can be permanently marked and scored as a result of wanton carelessness, and every effort should be made to keep it clean. When tooling out a small casting with a " through " hole, it is helpful to keep a small piece of waste inside the chuck at the back of the jaws, as the precaution helps to protect the

scroll and inner parts of the chuck, to a certain extent, from the infiltrating action of small cuttings. The waste or rag should be frequently removed and either renewed or thoroughly cleaned from any small cuttings adhering to it.

closing the jaws, it may be judged to be O.K. If "finger-tip control" is maintained in the working of the chuck, one is then able to judge accurately the strength applied in gripping the work, which is so necessary in preventing distor-



A quite informal view of an industrial lathe—the operator often has the advantage of a compressed-air pipe-line—to keep the saddle-shears and chuck clean!

With regard to the lubrication of lathe chucks, the makers state that any good quality lubricating oil of medium viscosity is perfectly effective.

There are many people who are reluctant to use oil on their chucks, on the grounds that more harm than good is done, by the latter's capacity to pick up grit, swarf, etc., with a singleness and tenacity of purpose to be deplored. Be that as it may, the writer is of the opinion that the moving parts of a chuck should be given a trace of oil on occasion, with constant vigilance on cleanliness. If it is possible to spin the key round using only one finger, while opening and

tion in secondary operations—facing bushes, etc., to length.

In conclusion, perhaps I may be forgiven if I appear (to some readers) to have commented only on the obvious.

Believe me, the remedy is not always obvious to many new aspirants to lathe work, and it may be said in defence of the dodges referred to, that they have stood every test. Indeed, they are mellowing with the years. Perhaps, then, the experienced worker will accept these notes in the spirit in which they are offered, with a solicitous thought for the chap who is "feeling his way."

For the Bookshelf

Oxford Junior Encyclopaedia. (Oxford University Press, Amen House, London, E.C.4). 12 vols. 30s. per vol.

It is to be sincerely hoped that the title of these excellent volumes will in no way mislead prospective readers into believing that they are in any way infantile in their presentation. Although prepared and edited primarily as a basic source of reference for school libraries, their treatment lends itself admirably to assimilation by all ages, and the up-to-the-minute treatises on all manner of subjects will be found to be as collectively entertaining as they are instructive.

The plan of the volumes is as follows:—Vol. I, Mankind; Vol. II, Natural History; Vol. III, The Universe; Vol. IV, Communications; Vol. V, Great Lives; Vol. VI, Farming and Fisheries; Vol. VII, Industry and Commerce; Vol. VIII, Engineering; Vol. IX, Recreations; Vol. X, Law and Order; Vol. XI, The Home; Vol. XII, The Arts; of which Vols. I, II, III, IV and IX have already been published.

Readers of this journal will find Vol. IV of special interest, dealing as it does with the model makers most popular subjects, including ships, locomotives and railways generally, aviation, canals, bridges, motor vehicles and carriages. Other subjects dealt with include speech and languages, books and printing, distribution of news (post office, newspapers and broadcasting). Communication by travel, navigation and plans for interplanetary travel. They are profusely illustrated by line and half-tone reproductions.

Altogether an intriguing work, well worthy of a place in every home.

Model Car Supplement

The "M.C.N." Grand Prix Special

FOR those enthusiasts who look upon scale appearance as an essential factor in model car racing (and indeed everyone should), the "M.C.N." Grand Prix Special is still a favourite, and we reproduce this photograph to enable our many thousands of new readers to see for themselves how very attractive and realistic the finished model is. A special feature of the design, which will appeal to the model engineer, is the fully independent front suspension, by wishbones and coil springs. The bodywork does not present any major difficulties, but for those who feel that "tin-bashing" in aluminium is outside their capabilities, Messrs. Z. N. Motors can supply fully-formed shells ready for assembly.

The illustrated model which, incidentally, was scaled down for a 3.5 c.c. motor, was built to "M.E." drawings by a reader who has fitted aircraft-type pneumatic rear wheel and streamline-section front wheels. At the time the photograph was taken the fascia panel was incomplete and a steering wheel had not been installed, but the filler cap aft of the cockpit is functional and the outside "gear lever," though unconventional, is the lower member of the fuel cock by which the model may be stopped. The socket in the tail is for the accumulator jack to the glo-plug and the bracket on the near side is for the rear limb of the tethering bridle.

Although louvres are stipulated on the drawing, they have not been incorporated in this model; even so, the appearance is good and the general lines, though not based on any known prototype, are typical of modern Grand Prix practice.

The drawings are in two sheets and are available from the "M.E." Plans Service, price 4s. 6d. net, post free.

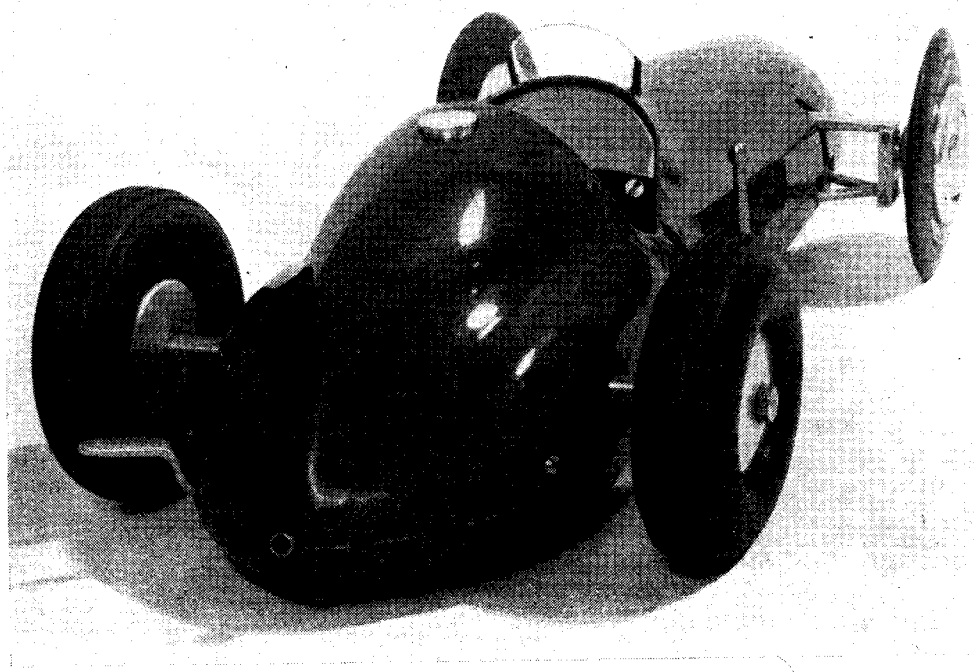
In view of the popularity of this model, we are prepared to offer (in addition to any other regular award which may be gained by such an entry), a first prize to the value of three guineas, a second prize to the value of two guineas, and a third prize to the value of one guinea, for the three best models to this design in the 1951 MODEL ENGINEER Exhibition. These prizes will take the following form :—

1st Prize : Either a year's subscription to THE MODEL ENGINEER and books to the value of one guinea, or books to the value of three guineas, to be chosen by the winner from the P.M. technical book list.

2nd Prize : Either a year's subscription to THE MODEL ENGINEER, or books to the value of two guineas chosen as above.

3rd Prize : Technical books to the value of one guinea, chosen as above.

Models must be entered in the normal way and will be judged, along with other entries, during the course of the Exhibition.



MODEL · CAR · ASSOCIATION

RULES GOVERNING RECORDS

(1) Compliance with Rules

All cars must comply in all respects with the car constructional rules.

(2) Record Classifications

Records will be divided into two sections, British and Open. Records in both Open and British classifications can only be set up by cars owned and run by British Nationals :—

(a) *British Records*
  (i) A car claiming the British record must only use parts made in Great Britain. This includes engines, tyres, gears, coils, condensers, spark- and glow-plugs, switches and all other manufactured parts, but not basic materials.
  (ii) British records must be set up within the British Isles.
  (iii) A car setting up a British record can, at the same time, set up an Open record, but not vice versa.

(b) *Open Records*
  (i) Open records may be set up by a car using parts made in any country.

(3) Record Distances

(a) Records may be claimed for runs over the following distance :—
  ¼, ½, 1, 5 and 10 miles.

(b) All records are flying start.

(4) Timing

(a) All records up to and including one mile, must be timed by electrical timing gear, with at least two hand-watches used as a check. The electric time shall be taken as official, unless a disproportionate difference appears between electric and hand timing. Should this difference be such that it is apparent that the electrical gear has miscounted the number of laps, then the run shall be declared void.

(b) Above one mile, records must be timed by two (or three) hand-operated stop-watches, the average of which shall be taken.

(c) Timing shall start when the competitor signals, and shall cease when the car has completed record distance, such time to include all stops for refuelling, etc.

(d) Timekeepers must be members of affiliated M.C.A. clubs.

(e) The record must improve previous record time by not less than 4/10oths of a second.

(5) Record Claims

(a) Claims must be submitted on the standard form and must reach the Records Officer, together with a postal order of 1s., within 21 days of the record run being made.

(b) The claim-form must be signed by the claimant, two timekeepers and an M.C.A. representative.

(6) "Horsing" or "Leading Off"

Where a car is "horsed" to start, timing must not be commenced until at least three full laps have been completed after "horsing" has ceased. Should the competitor signal for timing to commence before these three laps are completed, the timekeepers shall not start timing until the three laps are completed.

(7) Records may be set up either at Open meetings or by special attempt, providing the rules are complied with.

(8) Records may be set up on any size of track provided the track complies with the rules.

(9) Records may be set up without prior notification.

(10) *Capacity Check*

Rule (9) of the Competition Rules shall apply.

* * *

TRACK AND COMPETITION RULES

(1) Track

(a) The track shall be substantially level, an allowance of ½ in. in a width of 3 ft. and *pro rata* being permissible for drainage.

(b) *Centre Pole Adjustment*
The cable shall be attached to the centre-pole not lower than the top of the running surface of the track and not higher than 4 in. above this level.

(c) *"Horsing" or Lead-off Platform*
It is recommended that a platform be provided at the centre pole for the "horser" or lead-off man.

(d) Cables and clips of specified minimum strengths shall be used in the following four classes :—
  Class 10 :
  Class 5 :
  Class 2½ :
  Class 1½ :

(e) *Track Conditions*
If at all possible, the track should be cleaned prior to the running of each class.

(f) The length of each cable must be checked preferably, with a steel measure, before every Open meeting or record attempt.

(2) Officials and Duties of Officials

As far as is required by the particular competition, the following officials shall be on duty :—

(a) *Scrutineer*—whose duties are to weigh, measure and examine each car for compliance with Safety and Constructional Rules. In the event of disqualification of any car, the entrant has power to appeal to the referees.

(b) *Track Marshal*—whose duties shall be to examine and test the cable, direct the tethering of cars, check period on the line, and direct the stopping of cars if necessary.

(c) *Senior Timekeeper*—whose duties shall be the operation of the electric timer, reading and recording of each car's speed and signal that timing has finished. He will also receive objections for consideration by the referees.

(d) *Assistant Timekeepers*—whose duties shall be to operate a hand stop-watch to act as a check on the electrical timing apparatus.

(e) "*Horser*" *or Lead-off Man.* To assist with leading off cars when required. His main duty is to keep the line from dragging until such time as the car keeps it taut.

(f) *Paddock Marshal*—whose duties shall be to give competitors adequate prior warning of their being due on the line.

(g) *Referees.* Three referees shall be co-opted from visiting clubs, whose duty it shall be to consider objections and deal with them in accordance with the standing M.C.A. rules.

(3) Running of Competitions

(a) *Order of Running*
Order of running shall be decided by ballot, so that condition of track, weather, etc., cannot be taken to favour any competitor.

(b) *Time on Line*
This shall be decided by the organisers and may be amended at their discretion. Time will commence within one minute of the completion of the previous competitor's run. In the event of the running order being altered by withdrawals, etc., this one minute may be amended at the discretion of the Track Marshal.

(c) Once the car has come to the line, the time-limit shall be considered to have started. The time on the line must be taken in one period and cannot be split. The competitor may, however, remove his car and return to the pits for adjustments during the three minutes and the Track Marshal shall not place another car on the line until either the competitor returns, the time limit is reached, or the competitor informs him that the car is to be scratched from that run.

(d) Cars may be stopped and restarted as often as is desired by the competitor within the time limit, provided that *he has not* signalled for timing to have commenced.

(4) Timekeeping

(a) The competitor will signal for timing to commence by giving a clear signal by raising his hand above his head.

(b) The onus for signalling for timing to commence rests entirely with the competitor and timekeepers will take no action on directions from any other person. Timekeepers will commence timing one lap after the competitor has signalled.

(c) Timekeepers must signal that timing has finished immediately the electric timing gear has operated and certainly within two laps of the completion of the distance, e.g. : in a six-lap race, the contestant should be able to stop the car engine eight or nine laps after calling for time.

(d) In the event of the timing apparatus failing, or no run being recorded through some fault outside the control of the competitor, a re-run shall be permitted. This re-run shall take place after sufficient time has been allowed for the competitor to make his car ready again and every effort shall be made to make general conditions similar to when the false run was made, i.e. : the competitor must not be penalised for a fault outside his control. If the re-run is caused by failure of timing apparatus, this must be corrected and fully tested and two additional hand timekeepers co-opted before the re-run is permitted. On the re-run, the electric timing gear, the assistant timekeeper and the two co-opted timekeepers shall all take the time and in the event of the timing apparatus again failing, the average shall be taken of all hand-watch times, and this time shall be considered to be official (excepting only that a record cannot be claimed under these conditions).

(e) No competitor shall be expected to run more than twice in order to register one run.

(f) In the event of two competitors tying, both shall be requested to make another run, which shall decide the tie. This re-run cannot effect their positions, e.g. : tie for second place when re-run will only decide second and third places, even should the re-run exceed

the winner's speed. In the event of one competitor being unable to re-run he shall take the lower place of the tie.

(5) Competitors' Assistants

(a) Each competitor will be allowed one assistant only, unless physically incapacitated.

(6) Compliance with Rules

(a) Cars must comply with the constructional rules.

(b) Cars must be run in their grade as defined in the grading rules.

(7) Insurance

All cars must be covered against third party risks, by an approved insurance scheme.

(8) Capacity Check

(a) Should any objections be lodged on the grounds that an engine exceeds class capacity limitations, the referees may at their discretion cause the engine to be checked.

(b) Checking shall be done as follows :—

(i) The car shall be impounded for checking.

(ii) Two capable disinterested persons will be co-opted to do the actual check in the presence of the competitor. No other person shall be present.

(iii) The competitor will remove the necessary pieces to enable checking to be carried out.

(iv) After checking the checkers will state either " The engine capacity falls within the limits " or " the engine capacity does not fall within the limits." No other statement or dimension shall be given.

(v) If the engine is outside the limits. the car shall be disqualified and a report sent by the checkers to the hon. secretary of the Association.

(9) A complete set of rules must be kept at the timekeeper's hut at every meeting and be available to all competitors.

(10) Safety

All cars shall be inspected by a committee of two officials for compliance with safety regulations. A competitor who wilfully operates a car in an obviously unsafe condition, shall be requested to cease doing so, until the car is considered by the committee to be in a safe condition.

(11) Weather

In the event of bad weather, continuance of the meeting shall be at the discretion of the organisers. It is recommended that if one complete " round " has been run, the decision should be on the performances on this first run.

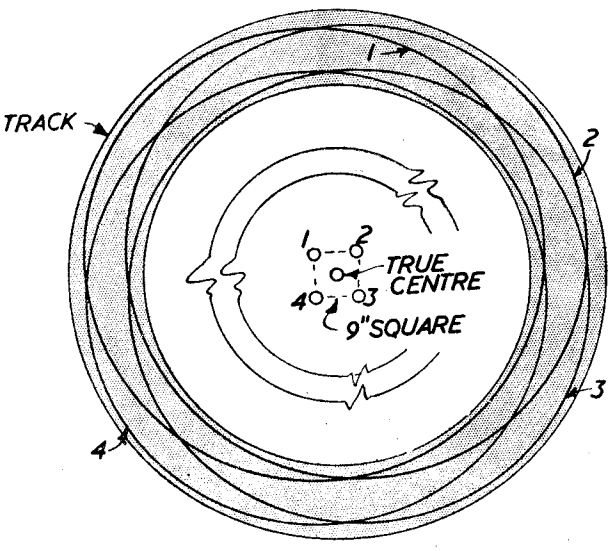
(12) Proxy

Running by proxy shall be permitted, provided that the car is run by a member of the same club as the entrant.

Reducing Track Wear

AN idea suggested by Ray Snow, designer and manufacturer of the " Hornet " racing motor, is to use four alternative centre-pole positions, offset about the true centre of the circle, so that running wear is more evenly distributed over the whole of the track surface by alternate use of the four centre positions. The basis of the scheme is shown in the diagram.

Normally, there is quite a proportion of the track width which has little or no continuous wear and the scheme has much to recommend it. The average track, for example, is generally 3 ft. wide and the length of cable is adjusted so that the inside wheels are running approximately 1 ft. from the inner edge. In other words, the cars use only the centre strip of the track or less than one-third of the total surface area. Mr. Snow's suggested arrangement subjects some two-thirds of the total track area to wear which should, roughly, halve the rate of wear over any particular part of the track. The scheme is not hard to rig. Four centre-pole fittings are required instead of one. Otherwise the rest of the gear is standard; as used by the majority of clubs in this country.



A SIMPLE ITALIAN CAR

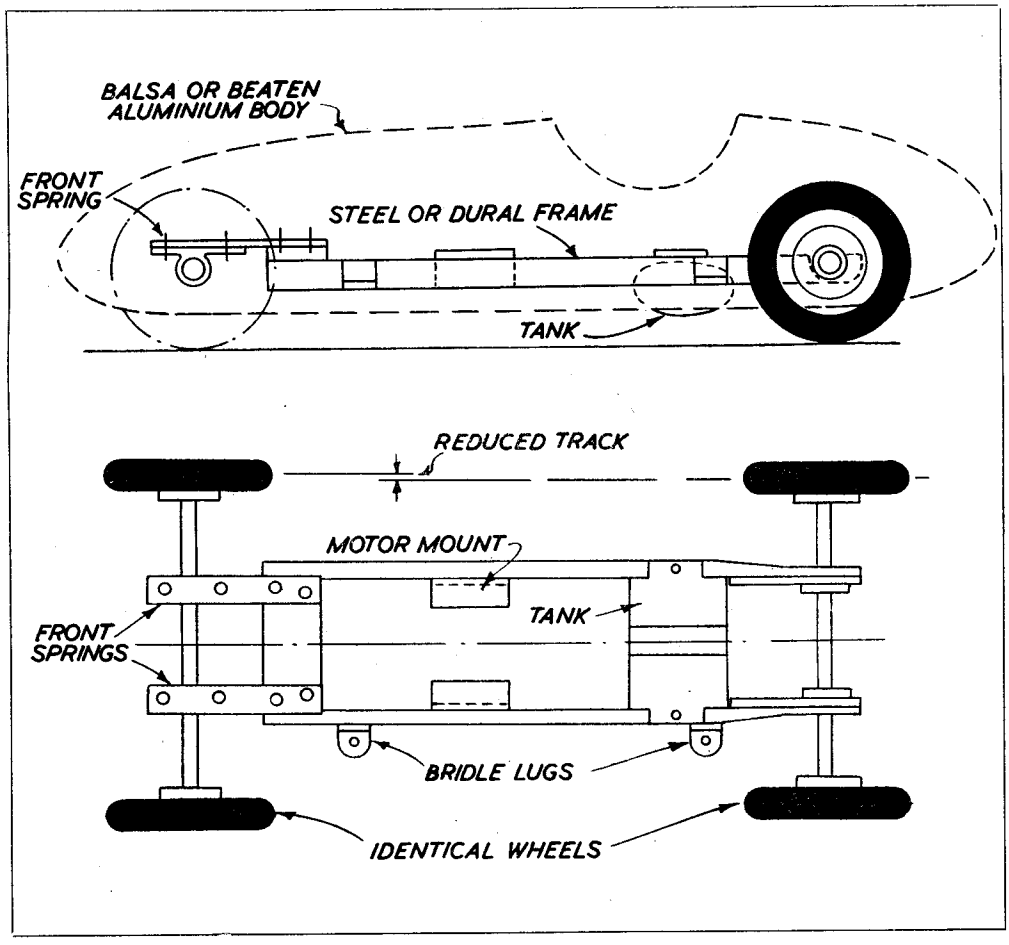
READERS are continually asking for ideas which will enable them to construct a simple chassis on which to mount a scale-type body. The answer is, of course, that each body, to depict a true model, should be fitted to its own particular type of chassis ; but here, nevertheless, is an extremely elementary layout which will take almost any type of body, with the possible exception of the very latest low-built Grand Prix types. Characteristic details may be added after the body has been positioned.

Designed around the 6 c.c. Osam G.B. 16 glow-plug motor, this Italian car model—the Serse—incorporates a number of interesting features. The front wheel suspension, for example, is different from usual practice.

The chassis members are of solid aluminium or dural, the latter appearing preferable and the whole unit a very simple one. The motor bolts directly on to suitable flanges, whilst the shaped rear spacer acts also as an attachment point for the fuel tank. This member, and the tank, incorporates a trough to clear the propeller shaft.

Bridle attachment points are simple brackets bolted to one side member of the chassis, and here again it is interesting to note that these are closely spaced and the rear pick-up point is forward of the rear wheels. The centre of gravity of the whole model will be slightly aft of the mid point of the wheelbase. Few details are available of the gearbox which appears to have a reduction of 1.5 : 1.

The whole of the bodywork on the original model was constructed from a block of balsa, shaped to simple outline form and then hollowed right out. No details were given on the original drawings as to how this was attached to the chassis. Alternatively, an aluminium body is specified, beaten out from 22-gauge sheet, or similar.



*The Design and Use of Drifting Tools

by W. M. Halliday

AT the point where the shank joins to the end of the clearance land *C* a radius fillet *F* of ample size should be provided to impart maximum strength and stiffness to the junction. (See Fig. 1.)

A chip groove *G* must also be provided where the pilot joins up with the squared sizing land *B*. This is required for two purposes. Firstly, in order to form the actual cutting edges *H* on the sizing land, and secondly, to allow a sufficient space immediately adjacent to those four cutting edges so that chips, and cutting may find egress from the workface.

Presence of such a groove will also greatly facilitate re-sharpening of the critical cutting edges *H*.

Such a groove will also reduce considerably the tendency of the tool to bind due to the accumulation of chippings and particles of sheared metal between the drift and the sides of the hole.

Thus this design feature will be of the greatest assistance in the operation of the drift and in preventing breakage of the pilot.

Useful Design Proportions

If successful cutting action is to be obtained with a simple drift of the kind just described certain proportions on the dimensions of the respective parts must be observed.

For instance the length of the pilot *A* and that of sizing land *B* will depend upon various factors, such as the length of the hole to be drifted out, the total area of metal to be removed, and the material of the component.

For most general purposes when forming triangular, square or hexagon holes in mild steel, it will be advisable to make the length of pilot from 1 to 1½ times diameter "*a*," which is the size of the plain drilled hole in the workpiece.

When drifting cast-iron, cast-brass and similar friable materials a shorter length of pilot will be quite satisfactory. In practice however, it will rarely be feasible to employ a pilot less than about three-quarters of the hole diameter "*a*" whatever the material.

The length of the sizing land *B* should be made about one third dimension "*a*," in the case of mild steel. This may advantageously be reduced to about one quarter diameter "*a*" for cast-iron and brass. For the softer metals such as aluminium and zinc an even shorter land length will suffice, *viz* about 0.20 dimension "*a*."

This land portion must be accurately formed and made perfectly parallel on all sides. The surfaces should be smoothly polished and preferably oil-stoned before use. Any surface defects present at this point will be transferred to the sides of the hole, being their exhibited in the form of scorings, scratches, or similar unsightly marks.

The sides of the clearance land *C* are tapered from ½ to 1 degree. The length of this portion should be from 0.70 to 0.80 of the hole diameter "*a*," or alternatively not less than about twice the length of sizing land *B*.

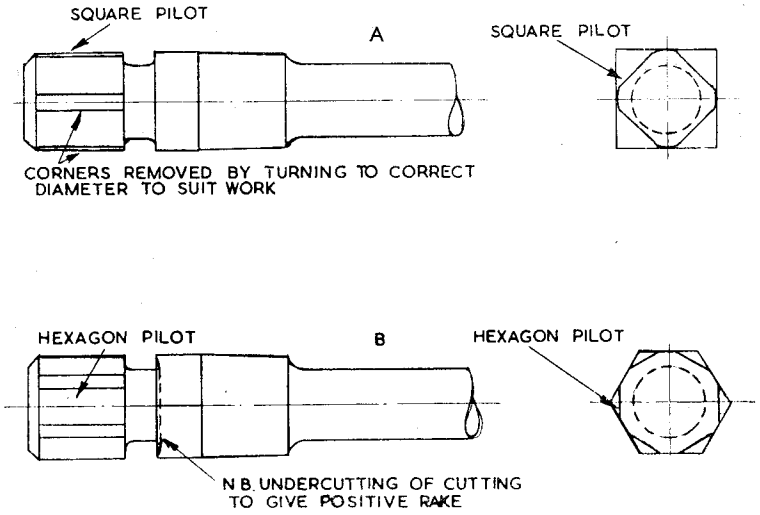


Fig. 2

*Continued from page 481, "*M.E.*," April 12, 1951.

The diameter of the shank *D* should be as large as practicable, ranging from 0.70 to 0.75 of diameter " *a*."

The shank should be exactly parallel over its full length, because in most instances this portion will be guided in a special holder plate, in a manner to be described later.

A point demanding especial attention when designing the drift, and later when using same, is that of the tendency of the chips to accumulate immediately underneath the cutting edge. If chips are allowed to pile up in this manner, continued pressure on the drift may cause excessive binding, the pilot to be snapped off, the

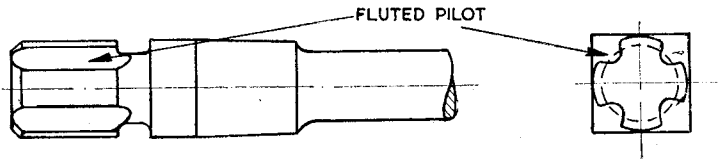


Fig. 3

A fillet of not less than one quarter diameter " *a* " should be provided where the shank joins to the body as at *F*.

The conical tip of the shank is extended for a distance of about 0.40 to 0.50 of diameter " *a*." This, incidentally, is of some practical importance especially with drifts which are to be operated by means of a hammer. If the diameter is left too large glancing blows may be more easily struck with the hammer resulting in the drift being driven into the workpiece out of alignment with the axis of the hole drilled therein.

This latter condition will not only incur grave risk of forming the hole inaccurately, or to the wrong shape, but might lead to fracture of the pilot, or serious damage to the cutting edges *H*.

Doming of the head of the shank also helps to minimise the above undesirable tendencies.

The chip groove *G* may be of semi-circular shape as shown, or have a flat-bottom. In the latter case however slight radius fillets should be left at each side. The width " *b* " of this groove should be not less than 1/5th of the hole diameter " *a*." The depth of the groove below the sides of the pilot should be sufficient to leave a perfectly flat side on the endface of the sizing land *B*. This will greatly facilitate re-sharpening operations on that surface.

For drifts required to operate in steel some care will be required when fixing the depth of the chip groove. If this is made too great the pilot may be unduly weakened and thus be more liable to crack or fracture at the point where it joins to the groove. A good proportion for this groove depth for cutting in mild steel is from 0.75 to 0.90 times its width.

Needless to mention, this groove should always be machined in the lathe, and never hand filed. It should be concentric with the pilot and other portions of the drift, and square with the long axis of the tool.

The groove may be made narrower when the tool is to work with softer metal such as aluminium and zinc.

Cutting edge *H* should be carefully ground up, in the tool-grinding machine for preference, after hardening, afterwards being lightly oilstoned. A very keen cutting edge is highly desirable.

The drifting tool should be kept as short as possible on its overall length to ensure proper stiffness and freedom from bending during its use.

cutting edges to be snipped, or a roughened surface finish on the sides of the hole.

To reduce such tendencies the modified design of drift shown at *A* and *B* Fig. 2 may be successfully adopted. The first form of tool *A* is for square hole drifting, whilst that at *B* is for producing a hexagon hole.

With the first design *A* the pilot is actually a square disposed diagonally with the squared sizing land on the main body of the tool.

This pilot portion is turned over the corners to the hole diameter of the workpiece, thus producing four narrow bearing lands. When such a pilot is introduced into the workpiece ample spaces will be provided by the main flats on the sides of the pilot to allow the chips to escape freely away from the cutting edges.

With the second design *B* of a hexagon drift, the pilot is formed hexagonal in shape and again turned up over the corners to suit the guide hole in work.

In connection with these adapted designs it is worth while noting that the chip groove is of a different shape to that shown in the diagram, Fig. 1.

It is flat bottom, and has been carried into the end face of the cutting land portion in such a manner that this will be slightly undercut (see lower diagram *B*).

The purpose of this slight undercut is to impart positive cutting rake to the sizing land portion.

Fig. 3 shows an alternative method of designing the drift pilot to ensure greater freedom for the chips to fall away from the cutting edges.

Here, the pilot is turned cylindrical and is provided with four laterially disposed clearance flutes along its sides. Each flute is located adjacent to a corner of the square sizing land on the body of the tool, which is the point where greatest cutting occurs, and where most chips will tend to pile up.

Method of Using the Drifting Tool

When shaping of sizing holes with drifts of the kind already described several important points will require careful attention. These can best be explained by describing the normal procedure to be adopted.

First the workpiece will be drilled at the correct point for the guide hole to receive the pilot of the drift.

The workpiece will next be mounted upon a substantial plate capable of withstanding the pressures to be imposed on the tool and work when the former is forced therein.

The drift will next be placed in the guide hole and will be correctly aligned square to the top surface of the component. A sharp smart blow will be exerted on the shank of the drift in order to produce a clear impression of the form to be produced.

The drift will then be removed and the corners of the hole will then be roughly removed either by a file or chisel. This operation will again be followed up by a further application of the drift, these actions being repeated until the drift can be forced completely through the hole.

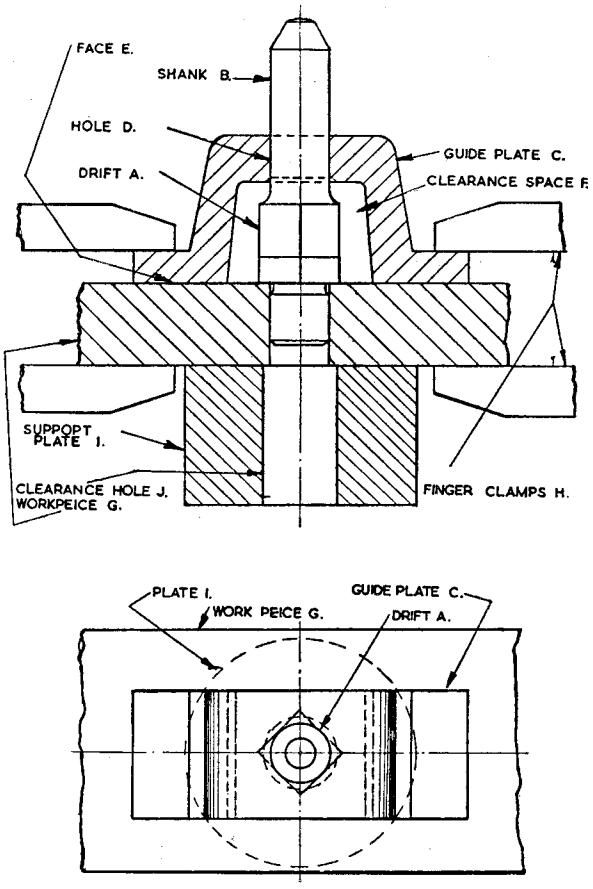


Fig. 4

With soft materials, and even mild-steel especially if rounded corners can be permitted, the drift may often be driven clean through the work at one pass without any intermediate filing away of corners, etc. On harder materials, however, it will be essential to remove excess stock in the manner suggested.

Throughout all these alternate pressing and filing operations considerable care will be required to ensure the drift is always maintained square with the axis of the hole.

If the drift is operated by means of hammer blows the user will easily be able to determine whether an unduly high resistance is being offered to its progress into the work.

The drift will also require lubrication, using a mixture of 3 parts general lubricating oil to one of tallow. This should be liberally smeared on the pilot and cutting edges to ensure a uniform film. The lubricant should be of a free running consistency.

The diagram Fig. 4 shows a very useful set-up whose object is to maintain the drift always in the correct alignment with the hole in the work.

The drift tool *A* is mounted with its cylindrical shank *B* in the bent guide plate *C*. This is provided with a drilled and reamered hole *D* for this purpose.

The base of the bent guide strip is finished level for the clamping surface *E*. A clearance space *F* is provided each side of the drift *A* as shown.

This guide plate is fastened to the top of the workpiece *G* by means of a pair of toolmaker's finger clamps *H*.

The workpiece is also mounted upon the thick support plate *I*, which is provided with the clearance hole *J* of sufficient diameter to allow ample clearance for the passage of the drift.

It will be understood that if face *E* is machined exactly square in each plane with the hole *D*, when the guide plate is affixed to the top of the work in the manner depicted, the drift tool *A* will be located in correct axial alignment with the pilot hole in the workpiece.

In width plate *C* is made about twice the diameter of the pilot on the drift. This plate may be in steel, cast-iron or brass as desired.

With the guide plate clamped in the position indicated the user will be able to sight the position of the squared formation of the drift *A* in relation to a scribed outline.

Use of a guide plate of this character is strongly to be recommended especially when the drift is to be forced into the work by the hammer.

Drifts can, of course, be mounted on the ram of a small fly-press, thus being capable of accurate adjustment and square setting. Used in conjunction with such a machine a constant feeding pressure may also be maintained.

Very effective drifts may be made from ordinary silver-steel rod, carefully hardened and tempered, and afterwards ground or stoned on the critical formations. All cylindrical portions of the drift should be turned at one setting, from centre holes in the part, these latter being removed after grinding.

IN THE WORKSHOP

by "Duplex"

No. 87.—Actuating the Leadscrew Clasp-nut of the 3½-in. Drummond Lathe

WHERE the fine feed with its control gear, previously described, is fitted to the lathe, there is no difficulty in traversing the saddle a few thousandths of an inch at a time or in stopping the feed at any required reading of the leadscrew index. With the standard arrangement for operating the leadscrew half-nut, however, it may be found that this nicety of control is somewhat lacking. The reason for this is partly that, to disengage the half-nut, a double movement is required, for the control knob must first be pulled outwards before it can be moved downwards to stop the feed. Furthermore, when a heavy cut is being taken, the friction between the square-thread leadscrew and its nut may be great enough to make the control gear somewhat difficult to operate, and in this way sensitivity and accurate timing are impaired. The alteration made to the apron gear, and here described, not only enables the half-nut to be opened with a single downward movement of the control lever, but also greater working leverage is obtained; moreover, the disengaging action is carried out by merely pressing the lever between the thumb and forefinger towards the lower edge of the apron. It should be noted that in this, as in the other modifications described, no structural alteration is made to the lathe itself; the lathe can, therefore, at any time be returned to its original standard form if desired, or should disposal of the machine be contemplated.

Engaging the Leadscrew Nut

In the Drummond lathe, the leadscrew feed-nut consists of a half-nut formed at the end of a lever pivoted in the apron; this lever is fitted with

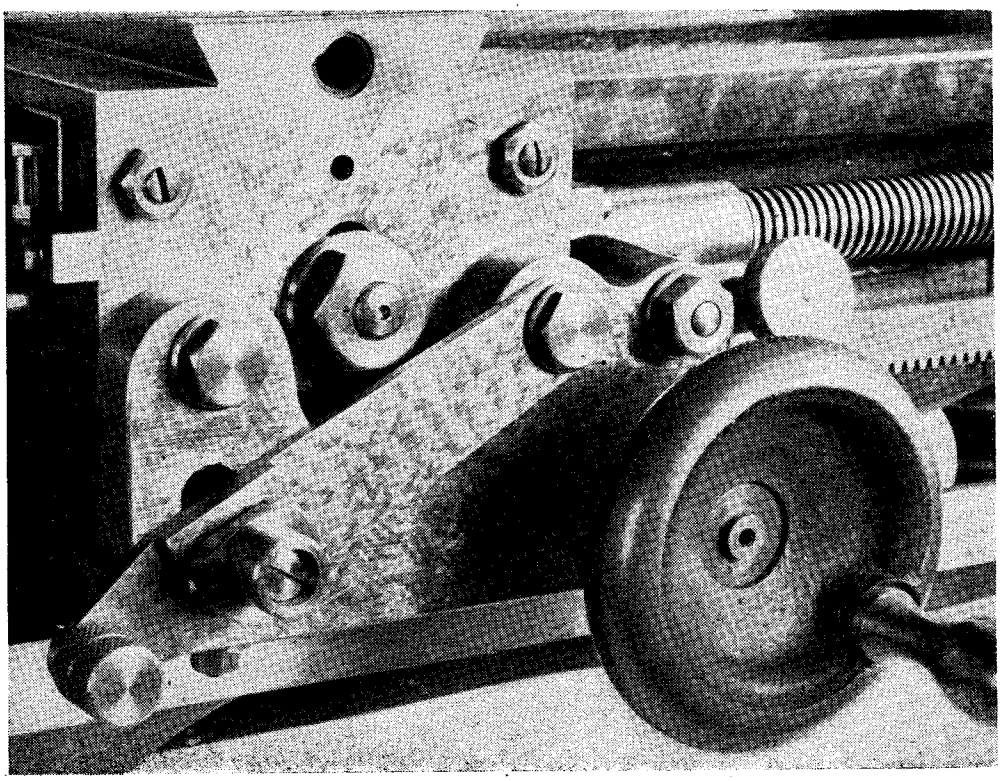


Fig. 1. The modified leadscrew-nut control mechanism in the open position

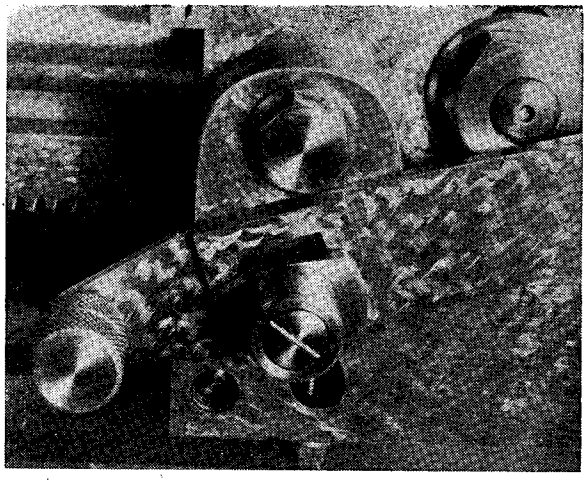


Fig. 2. Position of the parts with the half-nut engaged

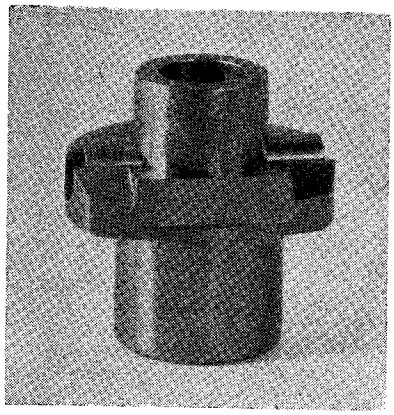


Fig. 3. The locking sleeve

a shaft which projects into a slot in the apron and is furnished with a spring-loaded control knob at its outer end. The purpose of the spring-loading is to withdraw the knob into a recess at the upper end of the apron slot and so lock the half-nut in the closed position. As will be seen in the accompanying photographs, in the altered design a control lever is fitted to pivot on the right-hand apron bolt which is shouldered down for this purpose. The depth of this shoulder is so arranged that the lever is kept in light frictional contact with the apron, but at the same time it is able to move freely and without shake.

The purpose of the lever is two-fold : namely, to move the spindle attached to the half-nut up and down, and also to unlock the spring-loaded catch when disengaging the half-nut. As there is some frictional resistance to the movement of the lever, and as the weight of the parts tend to keep the lever in its lowest position, there is no need for a locking device for the lever when the half-nut is disengaged. The original screw and spring fitted to the spindle of the half-nut are retained, but a special fitting is needed to replace the control knob, and this part is illustrated in Fig. 3. This spring-loaded locking sleeve is fitted with two cycle-chain rollers which are free to turn in their housings but are kept from moving outwards by setting up a small burr on the outer edge of either housing.

Although this mechanism has been in use for the past ten years, it continues to work smoothly and no wear of the working surfaces is detectable, in spite of the fact that the parts are not kept lubricated. To actuate the locking sleeve, a plate or bridle is attached to the upper part of the control lever.

This plate has an inclined surface formed at the tip of either of the two projecting horns of the forked portion ; when, therefore, the rollers, meet these inclined surfaces, the locking sleeve is raised from the recess in the apron, and further movement of the control lever moves the half-nut spindle downwards, thus disengaging the nut from the leadscrew.

The fitting of a thread indicator to the saddle

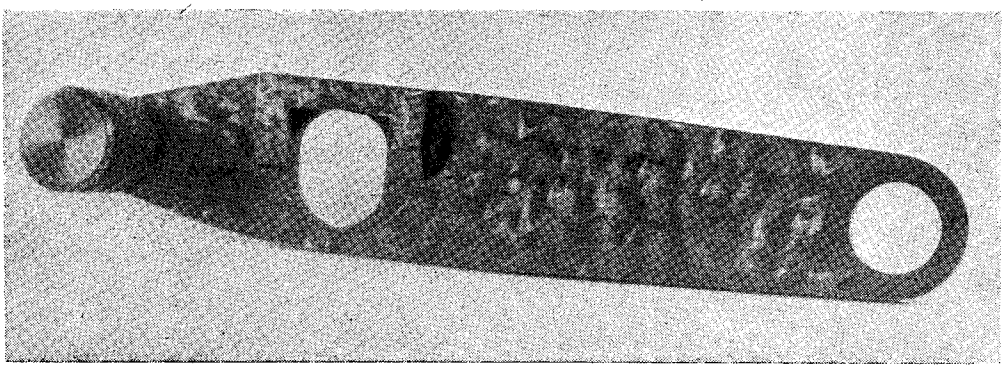


Fig. 4. The control lever with its bridle

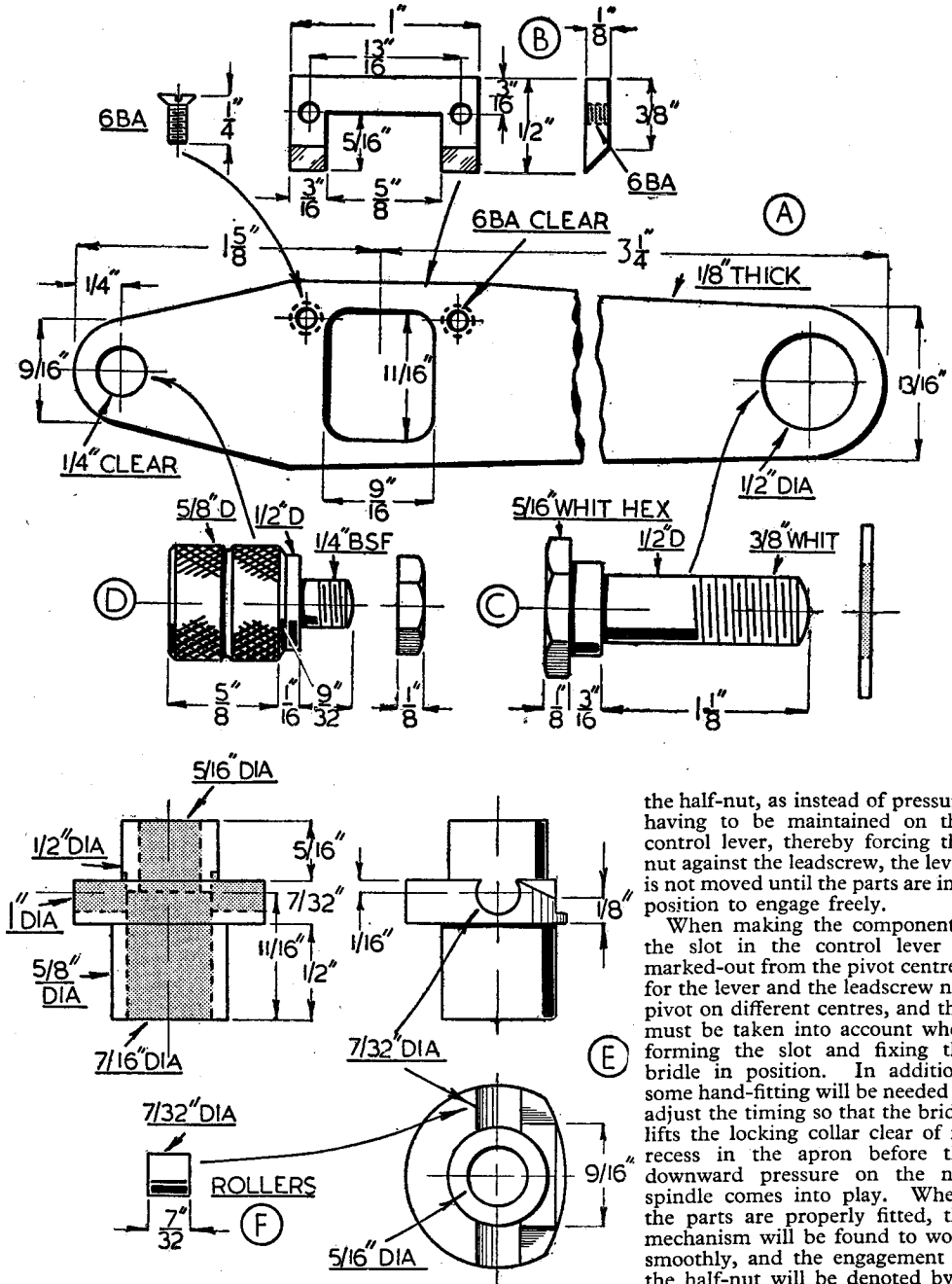


Fig. 5. The control lever, "A"; the bridle, "B"; the pivot bolt, "C"; the lever knob, "D"; the locking sleeve "E" with its contact rollers, "F"

will not only prove useful for screwcutting, but will also enable the feed-nut to be engaged with certainty whenever one of the graduations comes opposite to the index line. This saves wear of the half-nut, as instead of pressure having to be maintained on the control lever, thereby forcing the nut against the leadscrew, the lever is not moved until the parts are in a position to engage freely.

When making the components, the slot in the control lever is marked-out from the pivot centre; for the lever and the leadscrew nut pivot on different centres, and this must be taken into account when forming the slot and fixing the bridle in position. In addition, some hand-fitting will be needed to adjust the timing so that the bridle lifts the locking collar clear of its recess in the apron before the downward pressure on the nut spindle comes into play. Where the parts are properly fitted, the mechanism will be found to work smoothly, and the engagement of the half-nut will be denoted by a satisfying click.

The two chain rollers fitted to the locking sleeve are made of tough material which is highly resistant to wear, but, instead, short lengths of silver-steel can be used and these can then be hardened. To enhance the free and smooth working of the device, the strength of the spring

fitted to the locking collar should be adjusted to ensure certainty of action without adding needless pressure to the working parts. The bridle, if made of mild-steel, may be case-hardened to lessen wear; but, as already mentioned, these working parts have withstood prolonged use without being hardened or given ordinary lubrication. This may, in part, be due to accurate fitting which has resulted in free-working without excessive pressure occurring at the contact surfaces. The bridle actually fitted was made of tool-steel and left unhardened. This material, as manufactured by Messrs. Starrett, used to be obtainable in 18 in. lengths and in thicknesses ranging from 1/64 in. to ¼ in.; it is a high-grade carbon steel, ground to within a thousandth of an inch of the nominal thickness, and so is most useful for making tools and small machine parts.

It may be found that, when the control lever is moved to its lowest position, the leadscrew nut comes into contact with the upper surface of the saddle-rack. This excessive range of movement can be checked by fitting a stop-screw to the apron, as shown in Fig. 6. The screw is entered from below and projects into the apron slot so as to come into contact with the half-nut spindle as soon as the nut is fully disengaged from the leadscrew; when this adjustment has been made, the screw is secured with a lock-nut bearing on the lower surface of the apron.

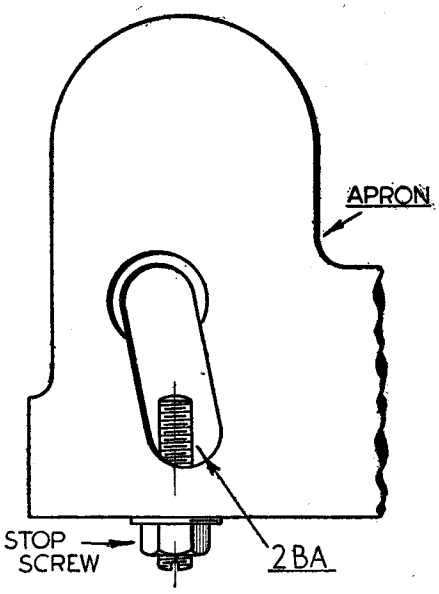


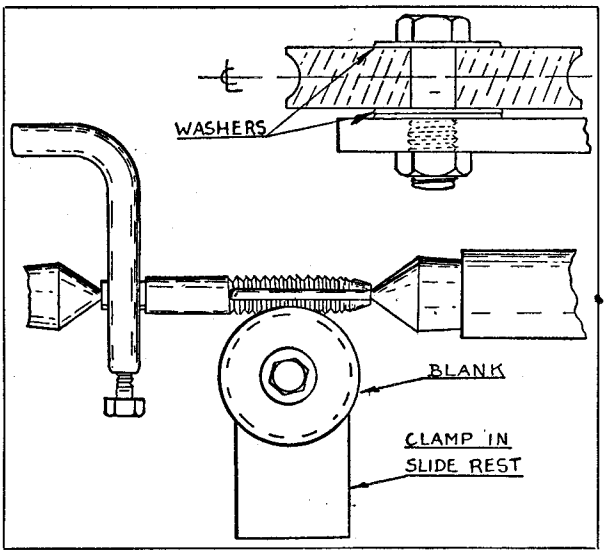
Fig. 6. Method of fitting an adjustable stop-screw to the apron

Cutting Worm Gears on the Lathe

WORM gear reduction units made on the lathe in the following manner have been found particularly useful for reducing the speed from fast revolving power units such as electric motors.

By setting up standard taps between the centres, teeth can be "generated" or "hobbed" on the gear wheel blank.

The range of thread pitches from gas threads to Whitworth, in their various diameters, give an adequate range of speed reductions. It is only necessary to calculate the ratio between the threads per inch of the tap and the circumference of the wheel. Incidentally, the writer has found that very great accuracy in turning the blank diameter is not necessary, as a small error is cancelled out over the large number of teeth on the wheel.



Rough turn the blank to the required diameter plus a 1/16 in. Drill and ream the bearing hole, mount up on a mandrel and finish turn the outside diameter. This will ensure concentricity. Then form the radius on the circumference of the blank to the core diameter of the selected tap.

Mount the blank on a suitable piece of flat material to grip in the slide-rest, and adjust for centre height by adding washers to suit.

At a slow speed, preferably with the back gear in, bring the blank to bear against the start or tapered portion of the tap. The blank will immediately revolve automatically. By sliding the blank farther up the tap, a heavier cut can be taken. Use lubricant, but do not force the blank too hard against the tap.

The worm can, of course, be screwcut or run down with a die.—ALAN G. STONE.

Queries and Replies

No. 9900.—Drilling Glass
A.C.H. (Ware)

Q.—I wish to make a table lamp from a glass jar, and would be glad to know how to drill a hole through the bottom so as to feed the flex through.

R.—There are drills specially made for drilling glass, but in the absence of such a drill, it is possible to drill a hole with an ordinary drilling machine or lathe, by using a piece of copper tube of the required diameter, charged with an abrasive paste such as carborundum. The easiest way to do this is to arrange the work so that the drill is fed vertically, and to build up a wall or dam of putty or similar substance round the tube, keeping the end well flooded with a paste made of carborundum powder and water, or better still, turpentine. A steady pressure should be kept on the tube by means of the normal drilling machine feed, but not sufficient to risk breaking the glass. This operation will call for a fair amount of patience, but the grinding action is quite positive, and will cut a clean hole.

No. 9904.—Armature Rewinding
S.V. (Workington)

Q.—I have recently purchased an electric grinder and filer for my workshop, and have found that the armature required rewinding. This job I have done myself, but the motor will not run without excessive sparking at the brushes, even though the rewind is an exact copy of the original winding. Particulars of the motor are—230/250 V universal, spindle speed 11,500, armature $1\frac{7}{8}$ in. diameter × $1\frac{1}{8}$ in. long, 13 slots, wound three coils/slot in 29 s.w.g. enamelled wire, and connected to 39 part commutator. The field coils are wound in 24 s.w.g. enamelled wire, each section having approx. $\frac{1}{4}$ sq. in. of copper. I have given the armature coil connections to commutator one bar lead, and two bars lead in direction of rotation, but neither connection brought any clearance in sparking. The winding is, of course, a lap winding with 28 turns per coil, and a coil pitch of seven slots inclusive. When I obtained the motor, the brushes were skewed to cover three commutator segments at once. This made me think it was a triplex winding, but even when the armature coils were connected as a triplex winding, the sparking did not stop.

R.—If you have copied the original winding faithfully, as to turns, coil span and comm. bar connections, the trouble is probably due to a faulty commutator. You state that the brushes span 3 comm. bars ; this is in error, as the brush should span only two bars. Multiplex winding would not in any case be found on small armatures. If the armature is wound right hand, the lead will be backwards from the neutral position, and the inner end of the first coil will be on a bar just coming up to a brush in the direction of rotation. On the other hand, the excessive sparking may be due to an imperfect field coil or coils. The word "excessive" must be taken with some reserve because it is a feature with some small motors to show a certain amount of sparking when at work. This usually indicates a fault in design, but it is not likely to do damage and is just part of the set-up. Provided there is no excessive heating with the sparking, all is in order.

No. 9902.—Motor Winding Formula
E.T. (Letchworth)

Q.—Could you please supply a simple formula for rewinding split-phase induction motors. I think the following is correct as far as it goes, but I am not clear how to calculate stator iron area or what flux density to employ :

$$\frac{v \times 10^8}{\sim 4\phi} = \text{turns total.}$$

R.—There is no such thing as a simple formula in design, but the working you show would be correct. Calculating the iron content depends upon so many factors. Flux densities in the gap may be up to 600,000 lines. The total number of turns will remain the same, no matter how many poles the motor is wound for. A single-phase winding will give more power because there is more effective iron in one pole and more magnetising turns per pole. The explanation of the thicker wire may be meant to indicate that a thicker wire may be used with less turns and so attain the same magnetic effect by using a larger current.

No. 9899.—Shrinking
D.R. (Highgate)

Q.—I would like your advice on the best procedure to adopt for "shrinking" a collar on to a tube. The tube is mild-steel $\frac{5}{8}$ in. outside diameter and has a wall 0.080 in thick. The collar is $\frac{7}{8}$ in. outside diameter and I can make the inside diameter any size necessary. Will you please let me know the inside diameter you recommend for the collar and the temperature to which the collar should be heated for shrinking.

R.—The interference for a shrinking fit on a tube $\frac{5}{8}$ in. diameter should be approximately 0.002 in. In view of the fact that the tube is of comparatively light section and will heat up very rapidly, it will be essential to carry out the shrinking operation as quickly as possible, and for this purpose, we recommend that some form of press should be improvised so that the tube and the collar can be held in correct alignment, and the tube forced home with collar in a single operation. The collar should be heated to red heat if possible, but if there is an objection to possible scaling of the material, a somewhat lower temperature would be satisfactory.

PRACTICAL LETTERS

An Inexpensive 35 mm. Camera

DEAR SIR,—With reference to Mr. G. H. Gunter's letter regarding the shortage of lenses in shutters, I would point out that although there have not been many advertisements regarding lenses in shutters of recent months, this does not mean they are not available. As there is so little demand for lenses of this kind, they are not listed, but a letter to one or two of the well-known photographic dealers, stating exact requirements, should produce some results.

Even the local dealer may have something suitable. Since making my camera, I have seen several suitable lenses in local dealers' shops including two lenses-mounted in focussing mounts, one with a compur shutter from a damaged Rolleicord for £7 10s. !

Readers may be interested to know that the counting mechanism of my camera has now been considerably improved by means of the gearing from my young son's clockwork motor, I was lucky enough to pick up a 36-1 train of gears (4-1 and 9-1) and these have been compactly mounted on the camera top, cutting out any guesswork or wasted film.

Yours faithfully,

Aintree. JOHN R. RUSSELL.

Camera Construction

DEAR SIR,—I was very interested to read the letter by Mr. Todd on the above subject. I have been making my own cameras and photographic equipment for a number of years now, although being by profession a Press photographer my interest naturally lies in Press cameras.

Naturally, throughout the years I have encountered (and in most cases, overcome) most of the snags which occur in designing, adapting, converting, and building a camera, and if I can be of any help to any MODEL ENGINEER readers who are contemplating making their own camera, I shall be only too pleased to do so.

Reply to a point raised by Mr. Todd in his letter. I do not know if he is aware of the difficulties to be encountered in building his proposed camera.

He stated that he wishes to photograph an object 2 in. square by 4 in. long filling the whole of a 3½ in. × 2½ in. plate. Now I do not know what focal length of lens he intends using, but assuming it is 4 in. (a normal focal length for this size of negative) he will need a camera extension of 10 in. and his lens will be a matter of 6 2/3 in. from the object. Furthermore even supposing it were possible to stop down his lens to f.100, his depth of focus would only be 3 in. In other words, he could not get the object dead sharp all over if it were photographed end on ; to say nothing of the terrific distortion caused by being so near the model. To improve the perspective and increase the depth of focus, he could employ a longer focal length lens. Let us assume he uses a 10 in. lens. To get the same size image as with the 4-in. lens he will need a camera extension of 25 in., his lens will then be 16 2/3 in. from the object he is photographing and his depth of focus at f.100 will be 9 in., which is more than enough. The only snag here is that I have never yet seen a 10-in. lens that will stop down to f.100. The maximum is about f.32, and at f.32 the depth of focus will be only 2 in. !—Worse than ever !

I would like to repeat my offer that if any reader would like any assistance in the theoretical or practical aspects of camera construction, I will do my best to help if he will write to me care of the editor.

Yours faithfully,

Mansfield. H. ARTHUR CLUES.

Rust Prevention

DEAR SIR,—Much has been written in your columns about corrosion prevention and many people appear to be slightly confused as to its causes and prevention.

In the first instance, it is not caused by moisture itself. Water only provides a solvent for atmospheric oxygen and acts as an electrolite and assists the electrical activity which is responsible for the chemical reactions involved. Mr. Heupy (March 1st issue) appears to have found the correct solution, which is constant temperature and air tightness of the workshop. He is mistaken, however, in regards to the action of cloth covers. They do not attract moisture any more than the air itself does. They are both hygroscopic and will absorb a certain amount of water, the quantity depending on the temperature and pressure conditions prevailing. It is probably generally known among your readers that if the temperature of wet air is lowered to below dew point the surplus moisture will precipitate on to anything providing a nucleus of attraction. A cold cover, silica gel or anything else which is in any measure hygroscopic will absorb the surplus or even in some measure absorb moisture directly from the air. Any movement of air about the point of absorbtion or precipitation brings fresh air in to shed its load. The best thing to do where complete air tightness cannot be obtained is to use an absorbent cover with a waterproof top cover. This restricts free movement of air, but, of course, cannot eliminate the flow of air caused by rise and fall of temperature, and is commonly known as " breathing." On my ML7 lathe which is situated virtually in a highway between the kitchenette and the garden, I place an old macintosh which has soaked up quite a lot of oil and a shaped cover made from balloon fabric. This does not completely eliminate the trouble, but it is noticeable that rust does not form where the metal is in contact with the cloth. Provided that the cloth is aired frequently, trouble is kept to a minimum.

I was also in the workshops mentioned by Mr. Wardman in 1943, but that was later in the year when day temperatures were only a mere 90 deg. and night temperatures approached 35 deg.

The unit was the Central Instrument Workshop of the Indian Electrical and Mechanical Engineers to which Corps I was posted for most of my tour out there. Being a vehicle mechanic, I was put in the ancilliary trades shop, and I saw tinsmiths breaking every rule I had ever learned about soldering and with every success. They were using iron-headed irons *red hot* on a mass repair job. The motto of the Corps was " Omnia Facimus " and I believe that the C.I.W.S. could.

Yours faithfully,

East Ham, E.6. A. E. CLAWSON.
(A.M.Inst.Mechs. Grad.I.Prod.E. Grad.I.E.D.)

CLUB ANNOUNCEMENTS

The Society of Model and Experimental Engineers

The next meeting of the society will be held on Thursday, April 19th, 1951, at 7 p.m., at Caxton Hall. The subject of the evening will be a film show entitled " Oil in Industry," made and presented by Messrs. Shell B.P. Co.

Visitors will be welcomed, and forms of application to join the society may be obtained from the Hon. Secretary A. B. STORRAR, 67, Station Road, West Wickham, Kent.

Bromley Miniature Power Boat Club

Our first regatta will be held at the Boating Pool, Whitehall Recreation Ground, Bromley, Kent, on April 29th, weather permitting (alternative date, May 27th), 10.30 a.m. to 5.15 p.m. Refreshments will be available.

His Worship The Mayor of Bromley has kindly consented to open the regatta.

Hon. Secretary : G. O. CAIRD, 26 Blackbrook Road, Bickley, Kent. Imperial 3814.

Blackburn and District Live Steamers

Monthly meetings of the above club have taken place throughout the winter, giving members the opportunity of inspecting each others bits and pieces and sharing views and news.

At the February meeting, Mr. J. Houldsworth (Lower Darwen Motive Power Depot), gave the first of what will prove to be a very interesting and instructive series of lectures entitled " Locomotive Development."

Mr. Houldsworth and Mr. C. Holden (Horwich locomotive works) are members whose daily work brings them into contact with the full-size locomotives, and their help and advice to members building miniature editions is much appreciated.

Members have visited the Lower Darwen depot on a number of occasions and a visit was paid to the G.N.R. works at Doncaster last summer.

Hon. Secretary : JOHN FOWLER, 21, Nares Road, Witton, Blackburn, Lancs.

Bournville Model Yacht and Power Boat Club

The annual Whitsuntide regatta of the above club will be held, as usual, on Whit Monday, May 14th, at the Valley Pool, Bournville, commencing 11 a.m.

The programme will include " A," " B," " C " and " C " restricted racing events, and a steering competition for prototype craft.

Hon. Secretary : M. FAIRBROTHER, Boathouse, Valley Parkway, Bournville Lane, Birmingham.

Croyden Society of Model Engineers

On Saturday, April 28th, from 3-6 p.m., the society will be holding its annual competition for three cups and other prizes, at its headquarters at 1, Duppas Hill, South Croydon. Visitors will be very welcome.

A new venture which is proving very popular, is a club magazine, *The Safety Valve*, run by two prominent members and giving details of the activities of the different sections.

Further meetings are as follows :—

May 10th. Lecturettes.
May 24th. " Boats " night.
June 7th. Working models.

Hon. Secretary : E. R. VAN COOTEN, 29, Kingsdown Avenue, South Croydon, Surrey.

Romford Model Engineering Club

On Thursday, April 19th, the British Oxygen Co. Ltd., will give a talk and demonstration at the Lambourne Hall, Western Road, Romford, commencing at 8 p.m.

The first track meeting of the season will be held in the grounds of the Lambourne Hall on Whitsun Saturday, May 12th. A special competition is being arranged.

Hon. Secretary : P. DUPEN, 48, Rockingham Avenue, Hornchurch Essex.

Oxford and District Society of Model and Experimental Engineers

It has been decided to hold the society's third exhibition to form part of the city's " Festival of Britain " programme, and will be held in the Town Hall, Oxford, during the week commencing September 17th, 1951.

The fact that we have obtained the use of the Town Hall means that we shall be able to accept more models for exhibit in the loan section, and we send out a cordial invitation to any lone modeller in the surrounding district, to enter.

A more comprehensive prize list is expected for this occasion, and it is hoped to compile a descriptive programme at a later date.

Information concerning the exhibition can be obtained from the Hon. Secretary, H. A. GOODINGS, " Silver Birches," Meadow Lane, Iffley, Oxford.

Forest Gate Model Yacht Club

The above club have formed a power boat section and have duly affiliated to the Model Power Boat Association.

We are open to receive suitable gentlemen as members.

Club house : Arch 342, Sheridan Road, Forest Gate. E.7.

Sailing water : Model Yacht Lake, Wanstead Flats, E.7.

Hon. Secretary : F. TAYLOR, 49, Leybourne Road, Leytonstone, E.11.

The Orpington Model Engineering Society

At a recent meeting, the date of the annual outing was definitely fixed for Sunday June 10th.

The Rotary Club exhibition will be open to receive exhibits on the Wednesday before opening day. Orpington society members will be in attendance all day from 10 a.m. till 9 p.m., and exhibitors are asked to bring their own work as far as possible. If anyone is unable to arrange transport for a heavy or bulky model, they should get in touch with the hon. secretary.

Members will be pleased to know that Mr. Chaddock (of turbine fame) has consented to give the club a talk and demonstration on Friday, May 4th, at 7.30 p.m. So if you would like to see something revolving at 120,000 r.p.m., come along. The invitation is extended to members of all clubs within reach.

Hon. Secretary : F. J. FRYATT, 68, Wellington Road, St. Mary Cray.

Sutton Coldfield and North Birmingham Model Engineering Society

At the last meeting, one of our members, Mr. H. Barr, gave us a talk on " Another Day on the Footplate."

The following meetings will take place at " The Yenton," Sutton Road, Erdington.

April 24th. Annual general meeting.
May 8th. " Bits and Pieces."
May 22nd. " Locomotive Valve Gear," by J. P. Bertinat.
June 5th. Open Night. " Refrigeration," by D. A. Field.

Hon. Social Secretary : P. R. SAMBIDGE, 16, Summerville Drive, Sutton Coldfield. Phone : SUT. 1343.

City of Leeds Society of Model and Experimenta Engineers

Future meetings of the above society are :—

Tuesday May 1st. Meeting at Salem Church Institute, Hunslet Road.

Friday, May 18th. We are invited to a meeting of the Keighley Society, and it is hoped that we can must a good party for this event. Further details later. Any member wishing to attend should contact the secretary at any meeting.

Visitors invited to any meeting.

Hon. Secretary : R. G. COLBRAN, 9, Church Wood Avenue, Headingley, Leeds 6.